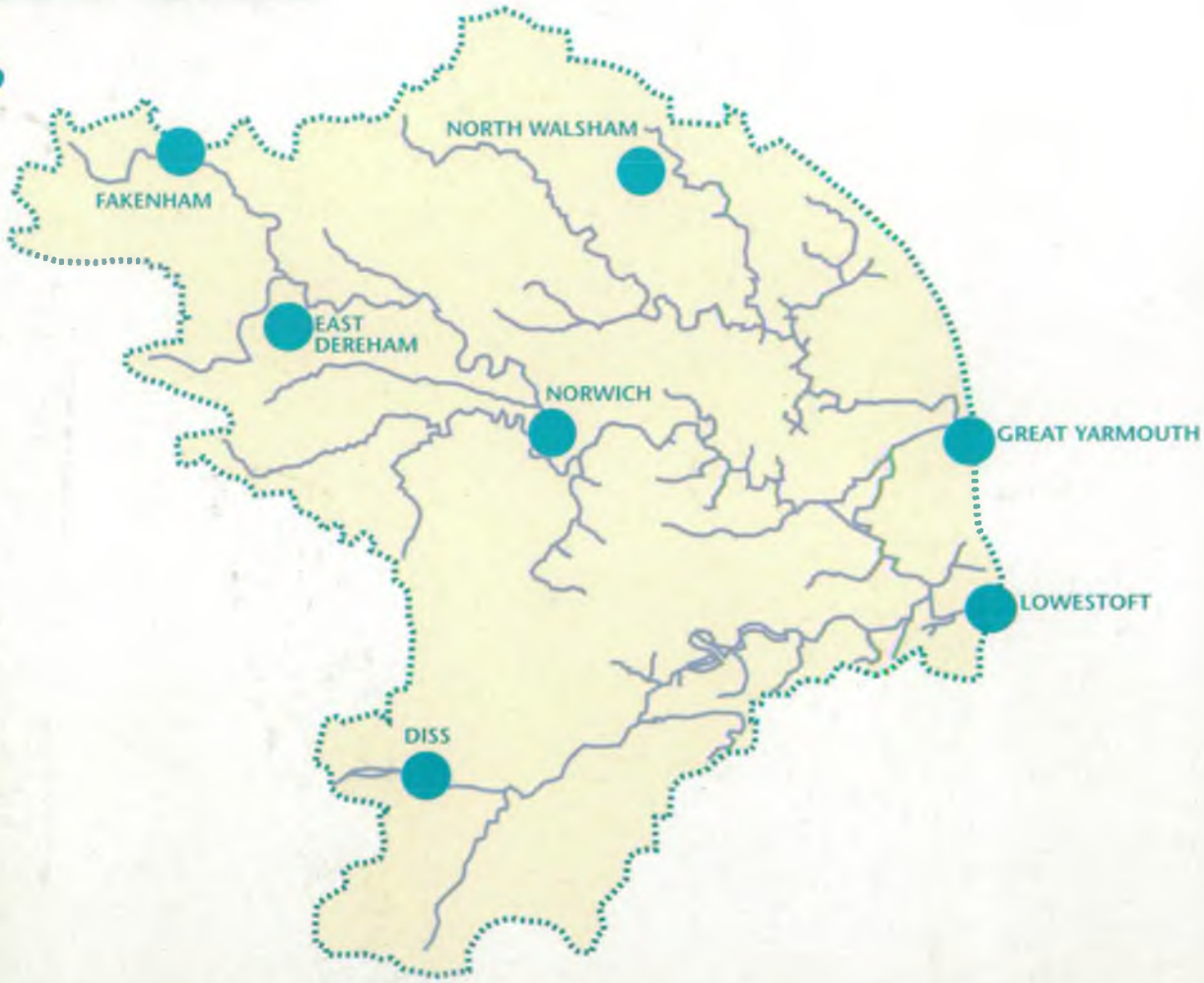
EA ANGLIAN

Amanda Price
Capital Planner
Anglian
Kingfisher House
1

local environment agency plan

BROADLAND RIVERS

Draft LEAP
March 1999



ENVIRONMENT AGENCY

key details

General

Land Area	3181 km²
Ground Levels	- Maximum 101m AOD
	- Minimum -1m AOD
Length of Coastline	33 km

Main Towns and approx. Populations (Mid 1997)

Norwich	125,200 (194,675 - Built up area)
Great Yarmouth	46,505 (65,105 - Built up area)
Lowestoft	57,520 (mid 1996 figures)
Dereham	14,435
North Walsham	11,435
Wymondham	11,195
Beccles	9,700 (mid 1996 figures)
Fakenham	7,295
Diss	6,500
Aylsham	5,330
Bungay	4,600 (mid 1996 figures)

Administrative Details

Local Planning Authorities: Norfolk County Council; Suffolk County Council

Breckland; Broadland; Great Yarmouth; North Norfolk; Norwich; South Norfolk; Kings Lynn & West Norfolk; Mid Suffolk; Waveney

Broads Authority

National Park Equivalent Status	Broads Authority
Environment Agency	Anglian Region, Eastern Area
Navigation Authorities	Broads Authority, Great Yarmouth Port Authority
Flood Defence Committees	Norfolk and Suffolk Local Flood Defence Committee

Internal Drainage Boards

River Wensum	Smallburgh
Lower Yare 1st	Lower Yare 2nd
Lower Yare 3rd	Lower Yare 4th
Limpenhoe & Reedham	Langley, Chedgrave & Toft Monks
Happisburgh to Winterton	Burgh Castle & District
Upper Bure	Middle Bure
Lower Bure	Repps, Martham & Thurne
Muckflat & South Flegg	Upper Yare & Tas
Waveney Valley	Lower Waveney
Lower Waveney 2nd	Lower Waveney 3rd
Oulton, Carleton Colville & Barnby	Blundeston, Flixton, Oulton

Water Management

Water Utilities: Anglian Water Services (AWS) and Essex & Suffolk Water (ESW)

No. of Public Water Supply Abstractions:

Groundwater	72
Surface Water	7

No. of Consents to Discharge:

Sewage treatment works	67 AWS	(>250 pe)
	29 Private	(>10 m^3/day)

Industrial discharges: 36, plus 9 water treatment works

Integrated Pollution Control

Integrated Pollution Control Sites 5

Waste Management

Number of Licensed Waste Management Facilities unavailable at time of publication

Water Quality

Length (km) of River in General Quality Assessment classifications, 1997

CHEMICAL		BIOLOGICAL	
Class A	45	Class a	224.5
Class B	198	Class b	205.8
Class C	131.5	Class c	88.2
Class D	115.2	Class d	11
Class E	54.3	Class e	0
Unclassified	8.5	Unclassified	23

Length (km) of Estuary in Coastal and Estuarine Working Party (CEWP) Grades, 1997

Class A	32.5
Class B	33.5
Class C	0
Class D	0

Bathing Waters monitored at:
Hemsby
Caister
Great Yarmouth (3 bathing waters)
Gorleston
Lowestoft (3 bathing waters)

Flood Defence

Length of Designated Main River:

Fluvial	360 km
Tidal	225 km

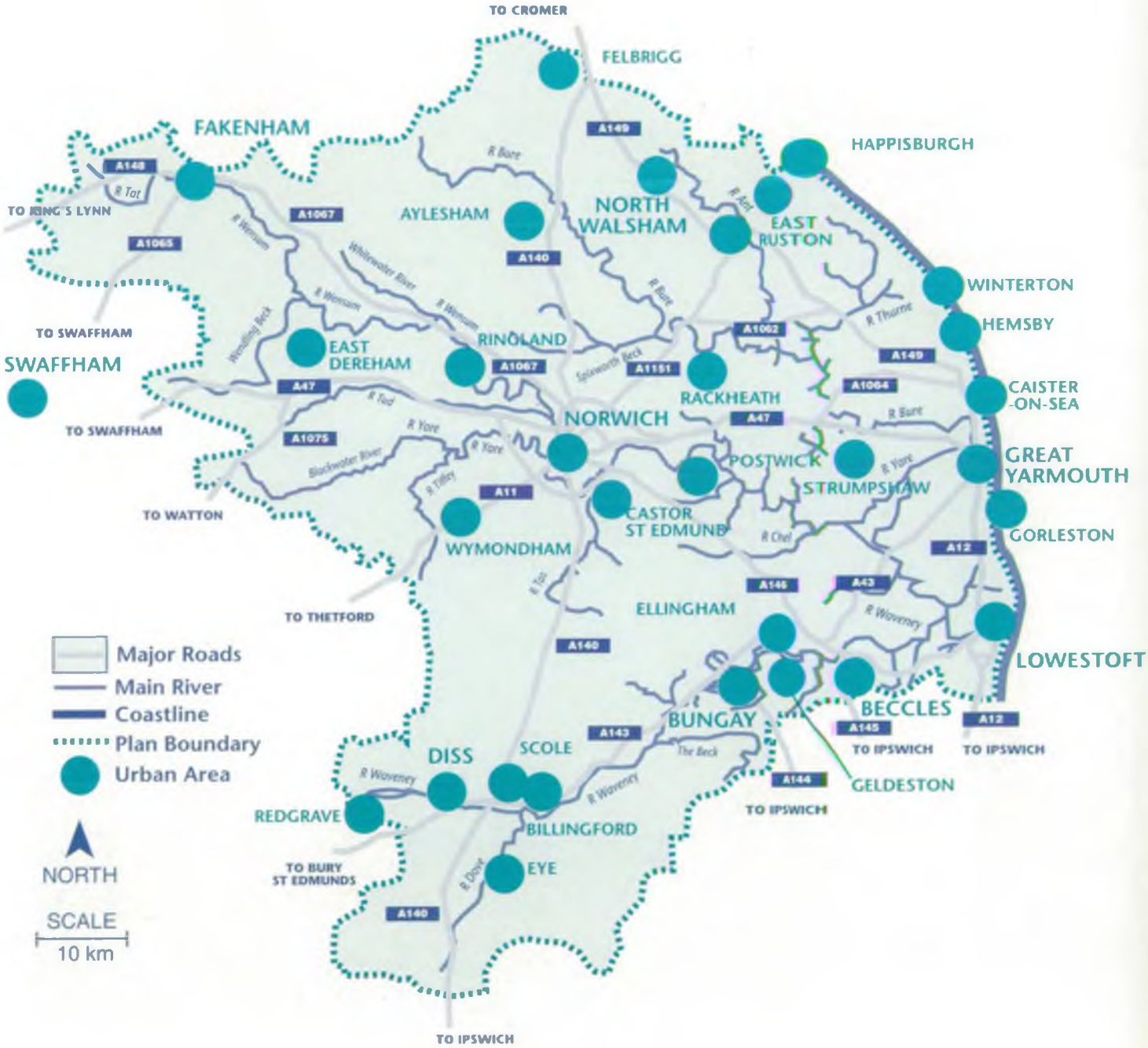
Length of Environment Agency Maintained Sea Defences: 14 km

Conservation

Numbers of:

Sites of Special Scientific Interest	83
National Nature Reserves	7
Local Nature Reserves	9
Ramsar Sites	7
Special Protection Areas	3
Candidate Special Areas of Conservation	4
Regionally Important Geological/ Geomorphological Sites	2
Scheduled Ancient Monuments	approx. 65

Map Overview



EA - ANGLIAN

your views

This Plan is the basis for consultation between the Environment Agency and all those organisations and individuals with an interest in the Broadland Rivers Area. The Environment Agency are keen to hear your views on the following:

- **Do you agree with our draft Vision for the Broadland Rivers?**
- **Have we highlighted all the major issues?**
- **Have we identified all the possible activities to address these issues?**
- **Which issues and actions do you consider to be of highest priority?**
- **Do you have any general comments to make regarding the Report?**

Comments on the Consultation Report should be sent to

Jenny Waterworth
The Broadland Rivers LEAP Planner
Environment Agency
Eastern Area - Anglian Region
Cobham Road
IPSWICH
Suffolk IP3 9JE

Tel. 01473 727712
Fax 01473 271320
Email address:
jenny.waterworth@environment-agency.gov.uk

All comments must be received by 30 June 1999

Further copies of the report or more information on this LEAP can also be obtained from the above address.

We will collate responses to this Draft LEAP and publish the Final LEAP in October 1999. The Final LEAP will focus on the issues raised in this draft, and, in partnership with a number of other organisations, agreed actions to tackle these issues will be identified.

FOREWORD

The Environment Agency is a major environmental protection organisation responsible for regulating waste disposal to land, industrial releases to air and for safeguarding and improving the natural water environment. Our overall aim of protecting and enhancing the environment, as a whole, contributes to the world-wide environmental goal of sustainable development. We are committed to a programme of Local Environment Agency Plans (LEAPs) in order to produce a local agenda of integrated action for environmental improvements. LEAPs also allow us to deploy our resources to the best effect and optimise the benefit for the local environment.

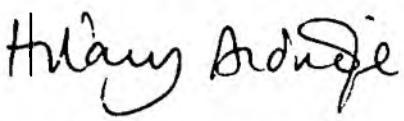
The Broadland Rivers Draft LEAP is the fourth LEAP consultation document produced by Eastern Area, but follows new guidance recently implemented, which explains the somewhat different layout to the document.

This report provides a framework for consultation and a means of seeking commitment from those involved, to realise the full environmental potential of the Broadland Rivers area. A large proportion of this area is recognised internationally as being environmentally important and the tidal reaches of the rivers form one of Europe's most important lowland wetlands.

Whilst the Plan will be a focus for the Environment Agency's actions, factors such as partnership, public participation and the involvement of business communities will be essential to secure success. LEAPs rely largely on building and promoting partnerships. Where improvement works are required to overcome local issues we aim to work with other organisations and individuals to promote a feeling of joint ownership and to initiate joint funding opportunities.

The issues that the Environment Agency has identified to be addressed are listed here. It will be essential reading for everyone concerned with the future of the area. We look forward to receiving your comments and contributions. *Your views are important.*

This Plan is being circulated widely and we are keen to draw upon the expertise and interests of individuals, local communities and local and national organisations. These will enable the final LEAP to be produced with an agreed five-year programme of activity to enhance and protect the Broadland Rivers area. We hope that this Plan will enable a wider public understanding and debate of environmental issues that are of local, national and global importance.



Hilary Aldridge
Area Manager (Eastern)

OUR DRAFT VISION IS...

to create a better environment for present and future generations. This will be achieved on a local scale by working in partnership with other organisations and individuals to implement schemes that are of tangible benefit to the local environment and promote sustainable development.

Our prime objectives for the Broadland Rivers area are to:

- continue to improve the conservation value of the area, particularly with respect to protecting, enhancing and, where appropriate, restoring wetland and coastal habitats and associated flora and fauna;
- conserve features of archaeological and historic interest linked to the aquatic environment;
- provide effective flood defences and, where necessary, raise standards of protection, to maintain the integrity of the area's freshwater rivers and the coastal fringe;
- manage water resources in a sustainable manner to achieve a proper balance between the needs of the environment and those of abstractors and other water users;
- protect areas of groundwater that are vulnerable to pollution;
- liaise with local authorities by contributing to the production of Local Air Quality Management Plans, where required;
- provide effective regulation of industry, having regard to its needs while ensuring appropriate protection of the environment;
- develop and act on the National Waste Strategy and seek partnerships to encourage the reduction, reuse and recovery of waste in preference to disposal;
- maintain, develop and improve fisheries by meeting appropriate fisheries biomass target classes on freshwater rivers, and by the promotion of sound fisheries management policies on all still waters;
- maintain and improve water quality, particularly where water quality targets are not being achieved;
- interact with, listen and respond to the community and make a positive contribution towards sustainable development;
- seek opportunities to protect, improve and promote recreation; and,
- ensure that people's appreciation of the environment continues to grow.

The Environment Agency will actively seek to reconcile the conflicting demands on the Plan area and target resources where they are most needed. Our objectives will be realised through establishing strong links with local communities, working together with conservation organisations, agriculture and industry and increasing public awareness of the need to protect our environment.

Contents

List of Maps

1.0 Introduction

1.1 Readers guide to the Draft LEAP

This is a management plan providing the following information:

- **Overview:** provides a general description of the Plan area.
- **Issues and Options:** highlights the environmental issues in the Plan area and proposes draft actions to help resolve them. This list is not exhaustive.
- **Protection through Partnership:** considers some of the longer-term, ongoing, strategic management issues that may effectively be addressed in partnership with other organisations.

The draft Vision for the Plan area at the beginning of the Report and the proposed Actions will only be finalised and developed into a Strategy once we have reviewed and considered the responses to the Consultation Report.

Please use the **Contents Table, Index and Glossary** to assist you further.

1.2 The Environment Agency

The Environment Agency has a wide range of duties and powers relating to different aspects of environmental management. These duties together with those areas where we have an interest, but no powers in, are described in more detail in Appendix A. We are required and guided by Government to use these duties and powers in order to help achieve the objective of sustainable development. The Brundtland Commission defined sustainable development *"as development that meets the needs of the present without compromising the ability of future generations to meet their own needs"*.

At the heart of sustainable development is the integration of human needs and the environment within which we live. Indeed the creation of the Agency itself was in part a recognition of the need to take a more integrated and longer-term view of environmental management at a national level. We therefore have to reflect this in the way we work and in the decisions we make.

Taking a long-term perspective will require us to anticipate risks and encourage precaution, particularly where impacts on the environment may have long-term effects, or when the effects are not reversible. We must also develop our role to educate and inform society as a whole, as well as carrying out our prevention and enforcement activities, in order to ensure continuing protection and enhancement of the environment.

Our Vision is:

- a better environment in England and Wales for present and future generations

Our aims, nationally, are:

- To achieve major and continuous improvements in the quality of air, land and water.
- To encourage the conservation of natural resources, animals and plants.
- To make the most of pollution control and river basin management.
- To provide effective defence and warning systems to protect people and property against flooding from rivers and the sea.
- To reduce the amount of waste by encouraging people to re-use and recycle their waste.
- To improve standards of waste disposal.

- To manage water resources to achieve the proper balance between the Country's needs and the environment.
- To work with other organisations to reclaim contaminated land.
- To improve and develop salmon and freshwater fisheries.
- To conserve and improve river navigation.
- To tell people about environmental issues by educating and informing.
- To set priorities and work out solutions that society can afford.

We will do this by:

- being open and consulting others about our work;
- basing our decisions around sound science and research;
- valuing and developing our employees; and,
- being efficient and businesslike in all we do.

1.3 The LEAP Process

One of the key outcomes of the United Nations "Earth Summit" held in Rio de Janeiro in 1992 was agreement by governments that, in order to solve global environmental problems, local action is crucial: we must all therefore think globally but act locally. For our part we are committed at the local level to a programme of Local Environment Agency Plans (LEAPs) in order to produce a local agenda of integrated action for environmental improvement.

LEAPs help us to identify and assess, prioritise and solve local environmental issues related to our functions, taking into account the views of our local customers. As a result LEAPs allow us to deploy our resources to best effect and optimise benefit for the local environment.

The LEAP process involves several stages as outlined below:

Draft LEAP – Consultation Report - The publication of the Broadland Rivers Draft LEAP marks the start of a three month period of formal consultation. Consultation will begin with the following activities:

- Press release to advertise the Draft LEAP;
- Distribution of the Draft LEAP to key partners, consultees and libraries; and
- Display of leaflets and posters at various key sites in the LEAP area.

The purpose of the consultation period is to enable the Agency and all external organisations and the general public to liaise and reach a consensus about the management of the area.

Your views will be considered in preparing the next phase, the LEAP. At the end of the consultation period we will produce a **Statement on Public Consultation**, which will summarise the views expressed during the consultation process, together with our reply to these comments. This document will be available to all those who responded.

LEAP - The final LEAP report will take into account the results of consultation and the views expressed and will be published by October 1999. It will contain an agreed Vision, strategy and detailed activity plans, identifying timescales and partner organisations. These agreed actions will be incorporated into the Agency's annual business plans. Progress will be monitored and reported annually, by means of **Annual Reviews**. After five years, or sooner if circumstances dictate, the Environment Agency will fully review the LEAP.

The Norfolk & Suffolk Area Environment Group (AEG) oversee the production of these reports. One of the group's roles is to advise the Agency and its statutory committees on proposals and priorities for LEAPs, and to comment on LEAP Reports prior to public release. The independent members of this group each have particular environmental interests, but none are direct employees of the Agency. For instance, AEG members represent Water Companies, industry, local authorities, English Nature, the RSPB, fishery interests, Harbour Authorities, the National Farmers Union and other various organisations. In order to assess individual LEAPs in greater detail, AEG sub-groups are formed. The sub-group is usually composed of 4-9 members of the Norfolk & Suffolk AEG with particular interest in the LEAP area, and they spend considerable effort assessing and evaluating the issues raised within the area. We would like to thank the following AEG sub-group members for their assistance in compiling this Draft LEAP:

Sheila Ashford (AEG Chairman)	Broads Authority
Stephen Bolt	Anglian Water Services
John Brown	Broads Boat Hire Federation
Michael Green	Broads Authority
Trevor Jolley	Rhone-Poulenc
Tony Preston	Farming Co-operative, Framlingham Farmers
Ian Shepherd	Council for the Protection of Rural England
Janette Ward	English Nature

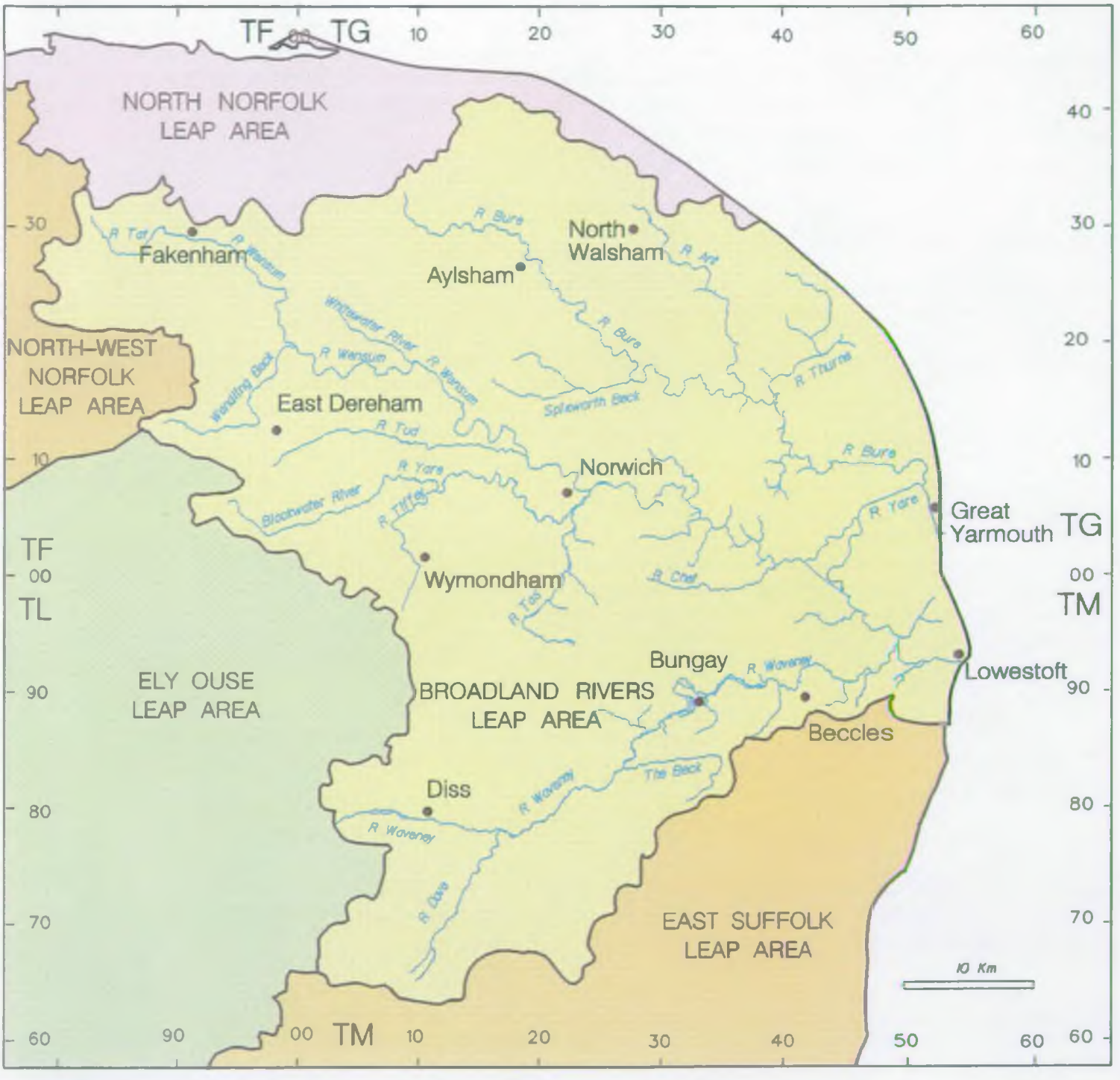
The Plan area is bordered by four other Anglian Region LEAP areas (see Map 1). The North Norfolk and East Suffolk LEAPs are also produced by Eastern Area. The Ely Ouse and North-West Norfolk LEAPs are produced by Central Area (call 01480-414581 to obtain their Reports).

Partnerships and LEAPs

LEAPs rely largely on building and promoting partnerships. Where improvement works are required to overcome local issues we aim to work with other organisations and individuals to initiate joint funding opportunities. The Agency often have no powers to control directly all identified actions and the responsible parties may be companies who see little or no financial benefit in carrying out the actions. We therefore strive to build partnerships and encourage public participation, to increase awareness of environmental issues and promote a feeling of ownership. Section 4.0 expands on the theme of achieving improvements and protection of the environment through a partnership approach.

Map 1

Local Environment Agency Plan Areas



ENVIRONMENT AGENCY

Main River

LEAP Boundary

March 1999

2.0 Overview of the Broadland Rivers Area

2.1 Introduction

The 'Broadland Rives' includes a substantial area of Norfolk and part of North Suffolk. The area covered by this plan can be divided into three major freshwater catchments: the River Waveney in the south; the Rivers Yare and Wensum, which combine at Norwich; and the River Bure to the north. It includes all the tributaries of these rivers and approximately 40 shallow lakes of the Broads. Also included is the coastal zone between Hopton (south of Lowestoft) and Walcott, just northwest of Happisburgh; see map on inside front cover. Map 2 shows the Broads area in further detail.

The rivers support a range of uses, which give rise to potential conflicts. Water abstraction for public supply is taken from the Rivers Bure, Wensum and Waveney and from major groundwater sources. This, together with abstraction for agriculture and industry, makes demands on water quantity, which need to be balanced with environmental requirements. The lower reaches of the rivers are tidal and, during periods of low flow, saline intrusion can become a problem (see Issue 5).

In Broadland, a large proportion of the catchment is below mean high tide level and potentially at risk from tidal flooding. A detailed strategy for the alleviation of flooding in Broadland has been completed. The Agency are exploring the implementation of this strategy (the Broadland Flood Alleviation Strategy) through a long term contract (approximately 20 years) using the Government's Public Private Partnership Programme (PPPP). This is, essentially, a method of utilising strategic planning, design and construction expertise from the private sector to finance and operate major public construction schemes in return for payment upon delivery.

There is no large-scale industrial development, although a number of small industrial estates have developed in many of the major towns. Sewage effluents are discharged from all of the principal towns to either the rivers or direct to the sea. The rural areas are served by a large number of small sewage works, although a substantial proportion of the area is not covered by mains sewer and relies on septic tanks. In general, due to continued investment in sewage treatment the acute effects often associated with sewage discharges, such as deoxygenation, is very rarely found. However, they have contributed to the increase in nutrients in the water environment which has resulted in eutrophication in the rivers and lakes within the plan area. This has led to a major initiative to control the supply of nutrients to the Rivers Ant and Bure, as the first of a series of steps to improve the environmental quality of these rivers (see Issue 14).

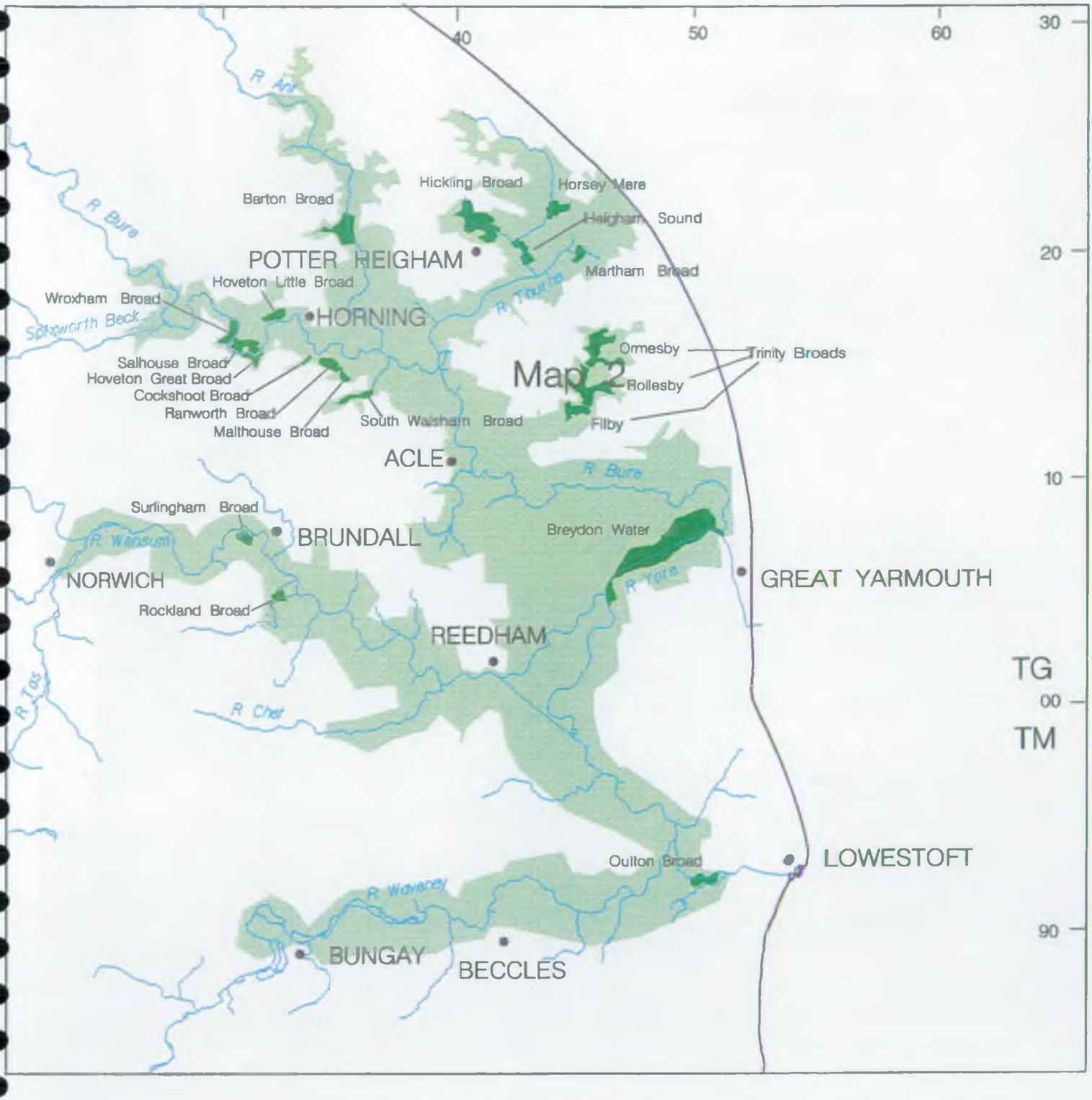
The Broadland Area consisting of the lower valleys of the Rivers Waveney, Yare and Bure is considered one of Europe's finest wetlands and is of international significance, its importance lies in the size of the area and the diverse range of habitats and associated species. The upper reaches and tributaries of these rivers are also of conservation interest, for example the River Wensum is designated as a SSSI.

The rivers and broads within the Plan area provide excellent opportunities for both formal and informal recreation. In particular, the Broads is an internationally known and renowned holiday area offering many miles of navigation and access to the water environment. The seaside towns of Great Yarmouth and Lowestoft are also popular tourist attractions.

This plan shows how the Agency proposes to discharge its responsibilities throughout this complex and extremely sensitive catchment. In doing so it will work with others to recognise all legitimate interests and resolve potentially conflicting uses. In view of the importance of Broadland, we will work closely with the Broads Authority to promote improvements in the environmental quality of the Broads. To this end the Agency has contributed to the development of the Broads Plan, "The Strategy and Management Plan for the Norfolk and Suffolk Broads" (February, 1997), to produce joint policy statements. It is not possible in this plan to provide detailed proposals covering all aspects of work within the catchment and other documents, such as the Flood Alleviation Strategy for Broadland, will serve this purpose. It does however, provide an overview of the catchment and an integrated approach to its future management.

Map 2

THE BROADS AREA



ENVIRONMENT AGENCY

Main River

Coastline

Broad Authority Area

March 1999

The Environment Agency, in partnership with Norfolk County Council, has also produced an environmental overview for Norfolk County. This document contains a factual description and analysis of the local environment and its associated pressures, on a county basis. This replaces the current practice of providing Environmental Overviews for each LEAP area. The Norfolk Environmental Overview is not subject to public consultation but is available on request.

2.2 Landscape and Heritage

Agriculture is the most important and widespread land use in the catchment and has a key influence on the landscape. In the river valleys, traditional grazing practices continue, encouraged by recent initiatives such as 'Environmentally Sensitive Area' (ESA) (a designated area where grant aid is available to support traditional farming methods) and other compensation payments.

Within the Broads Area the key character is the open valleys of the Bure, Yare and Waveney, the numerous shallow lakes of the Broads formed from mediaeval peat cutting, surrounded by substantial areas of undisturbed fen and wet woodland. The windpumps, many now in a state of disrepair, associated with the drained grazing marshes form an important part of the landscape.

Outside the Broads area the river valleys are an important feature of the landscape. In areas where arable is the main land use pasture still occurs along the river valleys. This traditional open landscape is now being protected through the Broads ESA, scheme which encourages traditional management, such as summer grazing of the marshes and cutting of fens.

Norfolk has a rich cultural heritage which dates from the Palaeolithic period (before 10,000 BC), through prehistoric, Roman, Anglo-Saxon and Medieval times to the present day.

From the earliest times, man has had a growing influence on the appearance of the landscape through erecting dwellings, clearing and farming land and forming routes through the countryside to link settlements. This has resulted in a rich heritage of historic domestic and industrial buildings, monuments and defensive structures in Norfolk which range from imposing country mansions, to fine churches, tumuli, farm buildings, windmills, Roman Forts, Pill Boxes and more modest houses and cottages.

The area has also a long boating history including the development of a distinctive sailing craft unique to the area, 'The Wherry'.

2.3 Nature Conservation

A large proportion of the LEAP area has exceptional environmental importance. The Rivers Yare, Bure and Waveney, in their tidal reaches, form the main arteries of Broadland, which is designated as the same status as a National Park.

The importance of the area is shown by its many conservation designations. These include the internationally important wetland dependent sites such as chalk rich fen and residual alluvial woodland. These internationally important sites are designated as candidate Special Areas of Conservation, Special Protection Areas and Ramsar sites. Species of international importance include Desmoulins Whorl Snail, Fen Orchid, Bittern and Marsh Harrier.

There are many SSSIs including the non-tidal section of the River Wensum which is a good example of an enriched, calcareous lowland river with a total of over 100 species of plants and a rich invertebrate fauna. In addition there are numerous non-statutory County Wildlife Sites in the LEAP area covering a wide range of habitats including woodland, grassland, heathland, fen and rivers.

The area is particularly valued for a number of rare and threatened species and habitats The 'Norfolk Biodiversity Action Plan' will help to identify actions to conserve such species as water voles. Section 4.8, 'Biodiversity Action Plans', provides further information on this partnership initiative.

Nationally important geological sites within the LEAP area include Bramerton pits and Broome Heath. The latter contains exposures of river terrace with silt lenses within the sand and gravel sequence. Winterton, on the coast, is an example of a dynamic "ness" feature that is characteristic of the East Anglian Coast.

2.4 Fisheries

In excess of 20 species of fish are to be found in the Broadland LEAP area rivers. Common species to be found are roach, dace, chub, pike, and eel, which are species typically associated with lowland river habitats in the UK. Trout are found in the upper reaches and tributaries of the Wensum, and Bure catchments.

It has long been acknowledged that many small streams and headwaters of rivers throughout the LEAP area supported fish populations, although these were not incorporated into any formal programme of fisheries survey work. Increasing emphasis is now being placed on the conservation of fish species, including a number of minor species such as bullhead and brook lamprey, which could occur outside of the main river reaches. Whilst data from the main survey programme are able to make valuable contribution to the development of conservation objectives for fish, it is entirely possible that valuable sites on smaller waters would be overlooked, due to a lack of information.

In order to address this difficulty, a programme of work on the smaller waters was initiated in 1996 with a minimum objective to define the distribution of fish species in all permanently flowing waters. The programme is now complete and a comprehensive picture of the distribution of minor species with high conservation status is now in place for the LEAP area.

2.5 Recreation and Amenity

As mentioned in the introduction , the rivers and broads provide excellent opportunities for recreation and tourism, and is an important feature of the local economy; also see Section 2.10. The population substantially increases during the holiday season and needs to be reflected in the provision of appropriate facilities.

The coastal fringe has always attracted holidaymakers and the area contains nine EC Bathing Waters, as listed in the 'Key Facts' at the start of the document. Inland, Broadland not only provides for holidays afloat, but increasingly, facilities are being developed to allow people to visit and appreciate the environmental diversity of the area. Water contact sports within the catchment include dinghy sailing, jet skiing, water skiing, canoeing and sailing. Norwich, as an ancient cathedral city, provides a base for holidaymakers wishing to enjoy the charm, history and unspoilt natural beauty of this catchment.

There are many definitive footpaths within the area and two long distance paths. In addition, countryside management projects in the Area, for example the Norwich River Corridor Enhancement Strategy (see Section 4.5) have negotiated permissive rights of way along the Rivers Yare and Wensum.

The Agency seeks to contribute towards the development of public amenity in a way that complements its statutory duties and responsibilities. The Agency owns a small amount of land within the plan area and looks to develop its recreational potential.

An important part of recreational use of the catchment is the interpretation and understanding of history, landscape and natural history of the area. Within this area, interpretation and education centres are run by Norfolk Wildlife Trust, RSPB and the Broads Authority.

Angling is a widely practised leisure activity in the Broadland Rivers LEAP Area. There are approximately 20 clubs and associations representing both coarse and game fishing interests.

Significant stretches of the major rivers in the LEAP area are leased to angling clubs by landowners. Angling matches are regularly held in the tidal sections of the Bure, Waveney, Wensum and Yare.

The Norfolk Broads have long been popular for both local and tourist anglers, with the peak months of activity being between June and October. Stillwaters are an important component of angling resource in the area. Commonly they are controlled by either angling clubs or commercial concerns, the latter having experienced significant degrees of growth in the last ten years.

2.6 Navigation

Throughout the tidal rivers in Broadland there are over 200 miles of lock free navigable waterways, providing the third largest navigable area in Britain with over 20,000 boats. The system is not connected to any other inland navigation but access to the coastal waters is available at Great Yarmouth and via Mutford Lock at Oulton Broad. The most important boating centres are Wroxham, Norwich, Potter Heigham, Horning, Oulton Broad, Great Yarmouth, Lowestoft, Beccles and Acle.

Responsibility for navigation within the tidal Broads area rests with the Broads Authority, with the exception of Breydon Water and the River Yare at Great Yarmouth where the navigation body is Great Yarmouth Port Authority. The Environment Agency is not the navigation authority within the LEAP area.

2.7 Climate

The climate has fluctuated 'naturally' over the centuries and as recently as the late eighteenth century there was a period of very cold winters in Europe known as the Little Ice Age. Recently there has been increasing concern that this change is now accelerating with an overall trend toward higher temperatures. There is general acceptance of global warming with national average air temperatures so far increasing by between 0.3 and 0.6°C during the 20th century. This is consistent with the expected effect of increased greenhouse gases, but is also within the bounds of normal climate variability. The potential impact of climate change on river flows, water quality, sea levels and coastal protection are covered in Issues 1 and 2.

The climate within the Plan area is typified by its low rainfall. There is little variation in the average monthly rainfall throughout the year. The annual rainfall is approximately 600 mm with only a small variation across the catchment.

In summer months the evaporation exceeds rainfall and the area has limited natural excess water resources. However, winter rainfall and recharge provides the water required during the summer months.

2.8 Hydrology

The catchment is relatively flat, the maximum height being 101 m above sea level. The surface geology consists principally of boulder clay although in the northern part of the catchment this becomes more permeable allowing a greater infiltration and retention of rainfall. This is evident in the flows in the upper reaches of the Rivers Bure, Ant and Wensum, which have a relatively high baseflow component and are therefore less variable than further south, where more impermeable boulder clay is encountered and the degree of natural regulation is less.

The principal aquifer of the catchment is the chalk, which is present throughout the whole area. It is overlain in two main areas; to the west by the boulder clay and in the extreme east by London clay, beneath which the chalk groundwater is saline. The London clay is itself overlain by crag, which forms a separate aquifer. In the area to the east of Norwich and west of the London clay boundary, the chalk is broadly overlain by glacial sands and gravels.

The water level in the chalk reaches a maximum within the catchment of approximately 60m AOD near the headwaters of the River Bure, decreasing to around sea level near Great Yarmouth. Groundwater flow is generally in an easterly direction. Some of the water recharge to the chalk aquifer is derived from the outcrop area beyond the western boundary of the catchment, although the greater proportion penetrates through the less permeable overlying strata within the catchment.

During dry summers, flows in the River Waveney can also be supported by water from a series of purpose-built boreholes in the River Dove catchment. The Waveney Augmentation Groundwater Scheme is owned and operated by the Agency.

There is an extensive network of hydrometric monitoring stations within the catchment, covering rainfall, river flows, groundwater levels, salinity, tide levels (both coastal and within the tidal rivers and broads) and wind speed parameters. Where these are used for flood warning purposes, the gauges are connected to the Agency's telemetry system.

2.9 Water Resources, Abstraction and Supply

Within the Agency's role is the requirement to balance the varied and competing needs for water resources. These include human needs, such as potable water supply, industry and agriculture, as well as those of the general water environment such as rivers, springs and wetlands.

Water resources within the catchment are derived from both surface (rivers/lakes) and groundwater. Overall availability is assessed by reference to river flow and the long-term average recharge to the aquifer from rainfall. The allocation of water resources is regulated by abstraction licences issued by the Agency under the *Water Resources Act 1991*. Licences are only issued if there is sufficient water available and the need for the water is justified, all rights of existing users are protected and rivers, springs or wetland sites, are not unacceptably affected. As water resources continue to be developed it is becoming common practice to include conditions in licences to safeguard these interests, most licences are also now issued on a time limited basis.

Many new abstractions require an environmental appraisal to ensure that nature conservation sites and the water environment are not unacceptably affected.

The current policy with respect to the availability of water for licensed abstraction is as follows:

- Available groundwater resources exist in certain catchments to meet predicted local demands. Development of the resource, however, is subject to increasing environmental consideration. Abstractions will need to be carefully located or incorporate ameliorative works to ensure that rivers and wetlands are not unacceptably affected. Additional groundwater abstraction will not be authorised in catchments where groundwater resources are assessed to be fully committed.

- Some additional surface water is available during winter periods when river flows are naturally higher and abstractors are encouraged to store this in reservoirs for summer use. Additional summer surface water is not available for abstraction.

2.10 Industry and Commerce

The dominant industry in this area is agriculture, principally consisting of cereal cropping and sugar beet production. However, numerous livestock units also exist, particularly in the Waveney sub catchment, where pigs and dairy farming are still common place.

Other significant industrial activities exist, centred on Norwich, Dereham and the major ports at Lowestoft and Great Yarmouth. Section 2.12, 'Air Quality', provides further information on industrial processes.

Tourism is also an important feature of the local economy, particularly the hire boat industry which makes a vital contribution to the economy of the Broads. Section 2.5 'Recreation and Amenity' provides further information on tourism and recreation.

Due to the diverse nature of the many activities carried out in this Plan area some pollution risk invariably exists. However, the Agency continues to work to minimise the risk of pollution through the use of pollution prevention initiatives (see Section 2.14, 'Water Quality') and contingency planning with port authorities (see Section 4.5, 'Contingency planning for large scale oil spills').

2.11 Radioactive Materials – Storage, Use and Disposal

Radioactive substances can be used in many ways that are beneficial to mankind. Within 'Broadland Rivers' these include medical diagnosis and therapy, scientific research and specialised industrial applications. However, most operations involving the use of radioactive material generate radioactive wastes, which need to be appropriately controlled. These wastes can occur as gases, liquids or solids. Airborne and liquid waste may be discharged to the environment, after treatment if necessary, while solids are disposed of to appropriate sites or stored until a suitable disposal route becomes available.

Radioactivity also occurs through natural sources. Most radiation exposure to the population is through cosmic rays, gamma rays from the earth, radon and thoron decay products in the air, and various naturally occurring radionuclides in foodstuffs. Very little exposure (less than 0.1%) results from the discharge of airborne or liquid radioactive waste. The volume of solid radioactive waste is small in comparison with other wastes, accounting for only 0.02% of the total annual wastes production in the UK, and nearly four fifths of the radioactive waste that is produced contains only a relatively small amount or radioactivity.

The Agency regulates the keeping, use and disposal of radioactive material under the Radioactive Substances Act 1993. The Agency also registers user of radioactive material, and premises where radioactive sources may be kept and used. Conditions are imposed to ensure that holding and transfer are properly recorded and supervised, and that correct procedures are in place for ensuring the proper disposal at the end of the useful life of the sources.

The Agency is also responsible for issuing authorisation to those undertakings which generate and dispose of radioactive waste, whether to air, the aquatic environment, landfill, or special repositories. We ensure that proper assessments of the impact on the environment are carried out and that the disposal is undertaken in such a way as to prevent harm to humans or to the environment. The Agency also ensure that disposal conform to the requirements of Government policy.

In the context of use of radioactive substances, the Agency applied the guiding principle of "As Low As reasonably Achievable (ALARA) and, because radioactivity can be measured accurately in very low concentrations, standards set on users are high.

2.12 Air Quality

Air quality is an important factor influencing the standard of human life. Air pollution can cause problems for people with asthma, bronchitis and other respiratory diseases. It can also damage flora, fauna and buildings, and have significant effects on soil, water and climate. Severe air pollution used to exist in heavily urbanised and industrialised areas. These problems have since been tackled by legislation and considerable progress has been made in improving air quality over the last 50 years. Further progress will probably be at a slower rate as the pollutant concentrations involved are much harder to measure and eliminate than in the past.

Local authorities have been given the responsibility for implementing the Government's National Air Quality Strategy at a local level. This will involve creating Air Quality Management Areas, where air quality standards are not being met and drawing up Action Plans to improve the situation.

The Agency will work with local authorities to clarify responsibilities for implementing the National Air Quality Strategy and to provide relevant information where appropriate (also see Section 4.2, 'Air quality management').

Local authorities have the main responsibility for managing air quality through the regulation of smaller less complex industrial processes and reducing traffic pollution. The Agency has a direct responsibility with respect to air quality through the system of Integrated Pollution Control (IPC) which is used to regulate the most potentially polluting industrial processes. Within this area there are currently four IPC sites, details of which are shown in Table 2.1. A fifth site is authorised, but not yet built, at Great Yarmouth; the Great Yarmouth Power Station, Amoco (UK) Exploration Company.

Table 2.1: IPC Sites in the Broadland LEAP Area

District Council	Company	National Grid Reference	Process Type
Broadland	British Sugar Plc Cantley Sugar Factory Cantley Norwich NR13 3ST	TG 3865 0330	Combustion Process Lime Manufacture Acid Process Drying Process
Norwich	National Power Plc Norwich G T Power Station Hardy Road Norwich NR1 1JR	TG 2480 0780	Combustion Process (currently shut down and in conservation)
Norwich	Rhone Poulenc Agriculture Ltd Sweet Briar Road Norwich NR6 5AP	TG 2050 1030	Manufacture & use of Organic Chemical (3 processes) Halogen Processes (3 processes) Inorganic Chemicals (2 processes) Pesticide Production (1 process)
Mid Suffolk	Fibropower Ltd Eye Power Station Eye IP23 7DH	TM 1320 7550	Combustion Process

Industry is not the only source of impact on air quality that the Agency has a role in regulating. As waste breaks down in a landfill site it produces a polluting liquid (leachate) and landfill gas. Methane and carbon dioxide are the main gases produced at landfill sites as the waste decays. Methane is a greenhouse gas linked to global warming. It has, volume for volume, a 21 times greater effect than carbon dioxide. Methane can be burnt (flared) on site and the energy produced used to generate power. This landfill gas is beneficial in two ways, as it reduces the methane emission into the atmosphere as it is broken down to carbon dioxide (a less potent greenhouse gas) through flaring and reduces the amount of fossil fuel consumed.

2.13 Waste Management

Activities within the area create a mixture of household, commercial, and industrial waste. Landfill is the disposal method for the vast majority of waste that is produced. Active and closed landfill sites are located throughout the Plan area. Their location is influenced by the geology of the land, and many former mineral workings are utilised as landfill facilities. All landfill sites have the potential to pollute the environment, as do all waste management facilities; the impacts on air quality are discussed in Section 2.12, above. Closed landfill sites, in particular, have the potential to cause problems as a result of them having operated before effective regulation was introduced.

Commercial, industrial and agricultural businesses will be encouraged to introduce improvements to resource management in order to minimise waste and contribute towards sustainable development. Local examples of companies who have taken part in this initiative are included in Section 4.3, 'Waste Minimisation Schemes'.

2.14 Water Quality

Within the Plan area the natural water environment is relied upon for a wide range of uses; recreation, public water supply, fisheries and conservation. Consequently, the Agency strives to ensure that the water environment is adequately protected and that water quality is suitable to support these diverse uses.

A comprehensive chemical and biological monitoring programme is in place to assess and quantify the quality of significant watercourses and to subsequently identify areas in need of improvement. Water quality in the plan area is generally graded as being good. Where the quality is not as good as expected then this needs to be investigated and mechanisms for improvements sought and implemented.

Pollution prevention plays an important role in helping to reduce pollution risk and protect water quality for the large abstractions of public water supply from the rivers Wensum, Bure and Waveney; Fritton Lake and Ormesby Broad. The provision of multi parameter water quality monitoring stations, located at Morton on the Hill on the Wensum and at Ellingham on the River Waveney, provide early warning of a pollution event, prior to it reaching the water intake. Significant groundwater resources in the plan area are also used for public water supply and the Agency focuses on pollution prevention activities within groundwater protection zones.

Another important use of the water environment within the Broadland Rivers area is for recreation and conservation, particularly in the Broads area, where a relatively high water quality is required to support these uses. Water quality in the Broads area has been significantly affected by the effects of long-term nutrient enrichment due to direct discharges from sewage treatment works and diffuse agricultural inputs. In the slow flowing waters of the broads and rivers, this has resulted in excessive algal growth in the majority of broads since the 1960s. This results in an unbalanced ecosystem that is atypical compared with the clear waters and numerous and diverse species found in this area earlier this century. A number of partnership restoration projects have been initiated such as the Barton Broad restoration project and the Trinity Broads project (see Section 4.5 'Trinity Broads Restoration' and 'Restoration of Barton Broad'). These initiatives will take time for improvements to be evident.

During periods of very low river flow, or when tidal surges occur, saline water can threaten the Broadland river reaches and cause fish kills (see Issue 5). Although it is not possible to prevent these occurrences, we aim to ensure that we have early warning of any such event to ensure that all appropriated mitigation actions can be undertaken. One aspect of this is the four fixed conductivity monitoring stations on the lower rivers Waveney, Thurne, Bure and Yare which are used to assist in providing early warning of a saline incursion and monitoring its progress.

Historical pollution of the river Yare with mercury in the 1970s continues to be an issue that requires addressing (see Issue 22). Much work has been done to develop a safe dredging and disposal strategy in partnership with the Agency and Broads Authority, whilst meeting the requirements of waste management legislation.

2.15 Flood Defence

Flood defence deals with the provision of cost effective, technically sound, sustainable defence for people and property against flooding from rivers and the sea.

Flood defence work is carried out to low-lying areas at risk from tidal flooding, and predicted sea level rise for East Anglia will place the Fens and Broads area, in particular, at further risk from flooding. This would result in loss of land and could cause further penetration of salt water into freshwater areas, as at Happisburgh to Winterton frontage. There are three current preferred options of responding to the threat of rising sea levels; improving flood defences, holding the line, or planned withdrawal of defences ('managed retreat').

Capital flood defence schemes are set out by our Long Term Plan , the development and implementation of which is overseen by the Norfolk & Suffolk Local Flood Defence Committee (LFDC). An example of this is the Flood Alleviation Strategy for Broadland which has been agreed by the Norfolk & Suffolk LFDC and Central Government, as mentioned in the Introduction. Currently the Agency carries out emergency works to protect the integrity of the flood defences for Broadland. However, we are assessing the proposal of a programme of bank strengthening and erosion protection for the 240 km of earth flood banks that protect over 21000ha of land within tidal Broadland and includes the improvement of flood protection for undefended properties. Ongoing monitoring and the production of Environmental Assessments at various levels ensures that the environmental needs of this area are addressed, particularly in the context of undefended areas.

Having completed any initial capital improvements, planned preventative maintenance to coastal frontages, river channels and control structures forms part of the annual routine maintenance programme. These works help preserve the integrity of the sea and tidal defences and maintain the flood discharge capacity of the Main Rivers. All works are carried out in accordance with guidelines to ensure that maintenance is sympathetic to the environment, by limiting damage and wherever possible, carrying out positive enhancement works as part of the operations works.

The programme is funded principally by a levy on the County Councils and Internal Drainage Boards supported by General Drainage Charge contributions within the Norfolk and Suffolk Flood Defence Committee Area.

A series of Shoreline Management Plans (SMPs) have also been prepared for the coastline. A Shoreline Management Plan is a document which sets out a strategy for coastal defence for a specified tidal frontage taking account of natural coastal processes and human (and other) environmental influences and needs. Research has suggested that the coastline of England and Wales can be divided into eleven major sediment cells. A sediment cell is defined as a length of coastline which is relatively self-contained, as far as the movement of sand and shingle is concerned and where interruption to such movement would not have a significant effect on adjacent sediment cells. Shoreline Management Plans provide the vehicle for the long-term sustainable protection of our coastlines and are part of an initiative backed by MAFF, Welsh Office, Local Government Association, English Nature and the Environment Agency. The Broadland Rivers coast falls into Sediment Cell 3, from the Wash to the Thames. Although this cell forms a discrete unit it has been divided into sub-cells to provide a more practical basis for the initial production of SMPs. The Broadland Rivers coast falls into sub-cell 3b of the Norfolk and Suffolk SMP.

The Environment Agency is also responsible for dissemination of flood warning information to those at risk in fluvial as well as coastal locations.

2.16 The Built Environment and Development Plans

Development within our cities, towns and countryside, and in particular the urbanisation of greenfield sites (land which has not yet been developed) has a major impact upon our environment. Development may include new building works, changes in land use and the development of communication systems and other such infrastructure. The predicted change in land use is identified through Structure Plans and Local Plans; see Table 2.2 for a comprehensive list of plans produced by the local planning authorities which fall within the Broadland Rivers Area; Map 3 shows the location of these authorities.

Map 3

Local Authority Areas

ENVIRONMENT AGENCY

March 1999

Main River

Coastline

LEAP Boundary

Local Authority Boundary (Norfolk / Suffolk)

Broads Authority Area

Table 2.2 Statutory Local and Structure Plans

Local Authority	Plan Status	Date
Norfolk County Council	Adopted Examination in Public of Review	April 1993 November 1998
Suffolk County Council	Adopted 3rd Alteration Consultation Draft Review	June 1995 May 1998
Breckland District Council	Inspectors report	December 1998
Broadland District Council	Local Plan Inquiry	December 1998
Broads Authority	Adopted	May 1997
Great Yarmouth Borough Council	Inspectors report	June 1998
King's Lynn and West Norfolk Borough Council	Adopted	November 1998
Mid Suffolk District Council	Adopted	September 1998
North Norfolk District Council	Adopted	April 1998
Norwich City Council	Adopted	December 1995
South Norfolk District Council	Norwich Area Local Plan Adopted Rural Area Local Plan Adopted District Wide Local Plan Inquiry	November 1994 February 1996 November 1998
Waveney District Council	Adopted	November 1996

Information correct as of January 1999.

The Suffolk Structure Plan and the Norfolk Structure Plan set out key strategic policies as a framework to feed into local planning by District/Borough Councils, as well as providing guidance to statutory and other organisations for their own plans and programmes.

Key locations identified for further housing development include the Norwich Policy Area, Dereham and to a lesser extent, Great Yarmouth and Lowestoft. Great Yarmouth in particular has important physical constraints to further development. The ports and Norwich Policy Area are identified as major locations for employment related development.

All development plans are increasingly recognising the importance of sustainable development and are acknowledging that land is a finite resource of fundamental importance, both to the local environment and the economy. Many policies exist to protect the environment as a result, for example, Suffolk County Council's 'Suffolk Countryside Strategy' includes core Action Points on encouraging the better management of water resources, reducing levels of pesticides and nitrates in surface waters and encouraging organisations to work together to reduce demand for, and the waste of, water.

3.0 Issues and Proposed Activities

In September 1997, the Environment Agency produced a national document entitled 'An Environmental Strategy for the Millennium and Beyond'. This strategy is essentially based upon the need to take an integrated approach to the management of the whole environment. We will deliver this strategy at a local level by dialogue between ourselves and the various organisations involved in the protection and management of the environment.

The Agency's principal and immediate environmental concerns are stated in this Strategy and relate to nine themes which represent the Agency's new holistic approach to environmental management:

- Addressing CLIMATE CHANGE
- Regulating MAJOR INDUSTRIES
- Improving AIR QUALITY
- Managing WASTE
- Managing our WATER RESOURCES
- Delivering INTEGRATED RIVER-BASIN MANAGEMENT
- Conserving the LAND
- Managing our FRESHWATER FISHERIES
- Enhancing BIODIVERSITY

As a first step towards achieving our aims and delivering our strategy in this area, issues have been raised and proposed actions have been identified, which now require to be consulted on. Each issue relates to one or more themes, as indicated by the following matrix.

	Issues																							
Theme	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Addressing Climate Change	√	√																						
Regulating Major Industries																								
Improving Air Quality																								
Managing Waste																		√						
Managing Our Water Resources	√		√	√	√	√																		
Delivering Integrated River Basin Management		√			√		√	√	√	√	√	√	√	√	√	√	√	√			√	√	√	√
Conserving The Land																	√	√			√			
Managing our Freshwater fisheries										√									√	√	√			
Enhancing Biodiversity	√	√		√	√																		√	√

Our intended approach for dealing with these challenges is set out in the following text, which show:

- The **Title** of the Issue;
- The Agency **Contact** for the issue;
- Supporting **background text** to explain the Issue; and
- Proposed **Activities** for resolutions of the Issue, and how these activities relate to our Environmental Strategy themes.

The following points should also be noted:

- Our everyday work commits substantial resources to monitoring and managing the environment.

- Some actions will require feasibility studies and cost-benefit appraisal of activities prior to work commencing. In some cases, depending on the outcome of these studies, further action may not be justified.

- This is only a Draft Plan, should more Issues or Activities become apparent during the consultation period, these will be added, where appropriate.

- Options are not mutually exclusive and are not in any order of priority.

Titles of LEAP Issues

1. Impact of drought and long term climate change on river flows and water quality.
2. Potential impact of climate change on sea levels and coastal protection.
3. There is a perception that existing available water resources may be inadequate to meet present and future demands.
4. There is a perception that actual flows are inadequate to meet in-river needs.
5. Adverse impacts on wetlands.
6. Current groundwater hydrometric network is inadequate.
7. Failure to achieve water quality and biological targets at a number of sites in the plan area.
8. A number of river stretches fail to reach their biological target despite good performance against water quality targets.
9. Failure to achieve dissolved oxygen targets at a number of sites in the plan area.
10. The current distribution of river reaches designated under the *EC Freshwater Fisheries Directive* does not adequately reflect the distribution of important fish stocks for which protection is required.
11. Mitigation and control of eutrophication in the River Wensum.
12. There is concern that the microbiological quality of the rivers in the Broads area may not meet the expectations of recreational users.
13. Bathing Water non-compliance with guideline values.
14. Nutrient control in the Rivers Bure and Ant.
15. Minimise pollution risk of both surface and groundwater public water supply sources.
16. Impact of new development on the sustainability of the environment.
17. Development proposals for disused airfields
18. Landspreading of wastes.
19. Failures in fisheries biomass targets.
20. Factors limiting Broadland fish populations.
21. Assessment of impacts of sediments on the aquatic environment.
22. Dredging and disposal of mercury contaminated sediments in the River Yare.
23. Need to better understand the requirements of headwaters in the Plan area.
24. Requirement to improve and protect habitat diversity within rivers and their floodplains.

Issue 1: **Impact of drought and long term climate change on river flows and water quality.**

Contact: *David Seccombe & Chris McArthur*

Background

It is considered important that the Agency has an indication of the impact of prolonged dry spells on our freshwater flora, fauna, river flows and water quality. In order to do this, a baseline is needed against which any impacts of climate change can be monitored and assessed. Latest forecasts are that winters are likely to be wetter and stormier, and summers warmer and drier. The effects on water resources are likely to include reduced summer river flows and higher peak flows in winter. Warmer drier summers will also create increased demands for public water supply and crop irrigation, leading to greater emphasis on demand management and water conservation measures. Increased temperatures may also lead to greater potential for eutrophication in open waters. Increased and improved monitoring is required to enable the Agency to assess and quantify any changes that occur as a result of drought periods.

There is also a need to proactively manage the most ecologically significant drought-impacted rivers. The middle and upper Waveney is of particular importance and an integrated strategy for mitigating drought impacts needs to be developed.

Proposed Activities

1. Review existing monitoring programme of ecologically important drought stressed rivers to ensure that appropriate data is available to enable a drought management database to be compiled.

2. Develop and implement an integrated drought management strategy.

For further activities relating to development and water supply, refer to Section 4.4, Development and Water Supply/Water Conservation'.

Issue 2: **Potential impact of climate change on sea levels and coastal protection.**

Contact: *Steve Worrall*

Background

The predicted sea level rise has implications for the coastal protection of the area. The future planning of sea defences needs to take account of possible sea level rise. An allowance is built into all sea defence designs to allow for future sea level rise.

Coastal protection, which relates to the management and control of erosion, is addressed by District Councils. The Agency has sea defence responsibilities, relating to the provision of effective flood defence rather than control of erosion, although these issues are often closely related. Erosion control of the coast is undertaken by the maritime district councils under powers conferred by the Coast Protection Act 1949. The Agency and the District Councils co-operate and co-ordinate their flood defence and coast protection powers through the Shoreline Management Plans, as mentioned in Section 2.15.

Important habitats for plants and wildlife are at risk from the sea. A study commissioned by English Nature, the Countryside Council for Wales and the Agency, is seeking to identify a number of internationally important sites designated under the Habitats Directive around the coastline of England and Wales at risk from flooding. Special account is being taken of the possible effects of natural processes such as sea level rise. Of international importance for nature conservation on the coast of this plan area are the Winterton Sand Dunes, which is designated as a candidate Special Area of Conservation (*cSAC)* and a Special Protection Area (SPA).

Any change in sea levels could have implications for the Broadland area and its internationally important wetland habitats by increasing the saline intrusion. (see Issue 5).

Proposed Activities

1. Where appropriate, ensure sustainable protection of habitats designated under the Habitats Directive and in line with guidance given in Shoreline Management (see Section 2.15).

2. Investigate the viability of re-creating habitats elsewhere as an alternative to saving a site where strategic studies show this the more sustainable, cost-effective and environmentally acceptable option.

Issue 3: There is a perception that existing available water resources may be inadequate to meet present and future demands.

Contact: *David Seccombe*

Background

Demands for water in the Anglian Region are progressively rising. Demand for public water supply is assessed by reference to predicted changes in population and consumption habits, as well as considering the potential for demand management practices, such as leakage control and metering policies. Demand management for industrial and agricultural use must also be considered. The 'Regional Water Resources Strategy', produced in 1994 expands upon these aspects and also identifies options for meeting or managing predicted increases in demand; this Strategy is due to be updated in 1999/2000, as mentioned in Activity 2, below.

Although Section 2.9 highlights that certain catchments have nominal surplus water resources sufficient to meet local demands, there is a continual need to periodically review resource assessments. It must be appreciated that such a detailed understanding will not resolve all of the concerns, but will provide a solid framework on which to reinforce robust and defensible policy which can be fed into the development planning process.

Proposed Activities

1. Research the possibility of producing a groundwater model of Broadland.

2. Review water balances as part of the Agency's National and Regional Water Resources Strategies during 1999/2000. This will include plans for sustainable water resources management to the year 2025, including resources assessment, environmental water needs and forecast demands for all sectors of abstraction.

For further activities relating to development and water supply, refer to Section 4.4, Development and Water Supply/Water Conservation'.

Issue 4: There is a perception that actual flows are inadequate to meet in-river needs.

Contact: *David Seccombe & Julia Stansfield*

Background

It is perceived that actual flows in some rivers and individual broads may be inadequate. These effects are perhaps more pronounced in the Anglian Region because flows tend to be sluggish anyway due to the relatively flat terrain. The combination of low flows, ponding of lower stretches of rivers and broads, and nutrient enrichment can encourage water within a river to stagnate and to develop weed or algal growth which may affect compliance with water quality targets, particularly dissolved oxygen

(see Issue 9). To determine the balance between the sustainability of aquatic ecosystems and abstraction or other uses, including the recreational use of water, requires extensive ecological and hydrological studies to establish acceptable water levels, flows and quality regimes.

Over the years the Anglian Region of the Agency has set Minimum Residual Flow targets at a number of points on rivers within the catchment. These targets are used in conjunction with river management and for guidance within the licence determination process. Although no objective criteria has been set which defines what is an acceptable minimum flow, the Agency uses a provisional estimate of the 'natural 95% flow' (this is the flow which would naturally be equalled or exceeded for 95% of the time). Whilst this is subjective and seems to work it is not scientifically based and can vary considerably as a proportion of the average flows in rivers with different characteristics.

Existing biology data is also being analysed using a newly developed procedure for relating invertebrate samples to river flow variables (LIFE index - Lotic Invertebrate Flow Evaluation). This will enable the effects of droughts and low flows to be quantified more effectively. These can then be taken into account when progressing Issue 8.

The Agency will also continue to progress studies to identify methodologies for evaluating River Flow Objectives (RFOs). The RFOs will define flow regimes (not just the minimum) to meet a variety of environmental objectives. Progress on RFOs has been slow because of data requirements and the multi-disciplinary technical specialists required to evaluate them. We are now reviewing options and methodologies to speed up the progress.

Proposed Activities

1. Continue with present approach/ policy which seeks to protect the 95-percentile flow and continue to use existing Minimum Residual Flows in the licensing determination process.

2. Trial the LIFE Index methodology on a number of rivers within the plan area, starting with the River Wensum, (suitability will be dependent on the assessment of field trials).

3. Continue to progress studies to identify methodologies for evaluating RFOs.

Issue 5: Adverse impacts on wetlands.

Contact: *Amanda Elliott & David Seccombe*

Background

This LEAP area contains some of Britain's finest wetlands. Significant water-dependent features in the area include the internationally important chalk rich fen and residual alluvial woodland. Species of international importance include; Desmoulin's Whorl Snail, Fen Orchid, Bittern and Marsh Harrier.

The hydrology of these systems and water quality and quantity requirements of many key species and habitats is poorly understood and further work is required to improve this understanding. A detailed knowledge of both groundwater and surface water hydrology within the plan area is required. In addition, an understanding of the interaction between groundwater and surface water is needed as well as defining the influence of tidal movement.

The area has also been identified as an important archaeological resource. The combination of high water tables and undisturbed, unploughed land within fen sites and alongside rivers has led to a high level of archaeological preservation.

Actions associated with this issue include:-

a. Implementation of the Habitats Directive
The Habitats Directive is particularly important in this Plan Area since a significant proportion of the area has been put forward as candidate Special Areas of Conservation (SACs) and parts are already Special Protection Areas (SPAs) and Ramsar sites. The legislation will have a significant impact on current Agency procedures and operational activities in the catchment, since it strengthens protection from activities occurring both inside and outside site boundaries.

We will be liaising closely with English Nature and other consultation bodies, over all operations and activities that may influence the SACs/SPAs; this will include the undertaking of formal Environmental Assessments, where appropriate. Priority habitats in the plan area include chalk rich fen and residual alluvial woodland as well as nutrient rich lakes and ditches and quaking wet mires.

We have special responsibilities to safeguard these sites when planning our own work or considering the action of others. We also have a requirement to review existing authorisations which might affect the conservation objectives of any designated site, and either affirm, modify or revoke them. This requirement has specific implications for water abstraction licences, Integrated Pollution Control authorisations, discharge consents and waste management licences.

The Agency must consider the impact of its consents and authorisations on rivers and associated habitats. Given our present state of knowledge it can be difficult to predict the impact of nutrients or changes in water levels on particular species or habitat types. It is important to work closely with others to gain a better understanding of key habitats and species.

b. Importance of freshwater flows over mudflats
A research project led by the Agency found a strong statistical link between the distribution of certain species of over-wintering wildfowl and the presence/absence of the freshwater streams feeding intertidal creeks within SPAs. Further research is currently underway to identify the environmental factors that make these sites important for waders. However, as an interim measure, the Agency is discouraging applications for all abstraction from streams that feed these creeks, until the understanding of the reason for their importance is identified.

Further work is required to determine the presence and importance of such streams on Breydon Water SPA.

c. Effects of public water supply on the environment
The Agency works in partnership with the water companies and English Nature to ensure that capital investments for environmental improvements to infrastructure are accorded priorities. Our influence on these matters is exerted through discussions with the water companies, the DETR and the Office of Water Services, known as 'Ofwat', as part of the Asset Management Plan (AMP) process which identifies the water companies capital expenditure within five yearly periods, over statutory and non-statutory requirements. We intend to assess and report on all situations where public water supply abstractions may impact on the environment to meet the AMP timetable. Case studies include East Ruston Fen and Strumpshaw Fen.

d. The effects of saline intrusion
Changes in sea level, together with manmade changes such as abstraction, land drainage and altering channel profiles, has changed the salinity regime within rivers and adjacent drained marshes, which are of international importance. For example, at Halvergate, the lowering of water tables (possibly by land drainage and abstractions) has meant that water levels have to be raised by use of river water; the increased salinity of this can have an adverse impact on the botanical and invertebrate interest of the ditches. Particular problems have also been noted in the River Bure and its tributaries, where significant fish kills can be caused by the sudden influx of saline water caused by tidal surges.

Proposed Activities

1. Work with others to research the environmental requirements of species and habitats; also see Section 4.8 on Enhancing Biodiversity.

2. Undertake a review of all Agency authorisations within the plan area that may significantly affect European/international sites.

3. Assess and report on situations where public water supply may impact on the environment, to meet AMP timetable, including East Ruston Fen and Strumpshaw Fen.

4. Water companies to obtain funding through the AMP3 process to complete investigations and, where necessary, implement solutions.

5. Work with others to improve the understanding of salinity changes and their importance within the Broadland system.

NB: This issue will also be considered by the Northern Rivers Group (see Section 4.5), and the actions will be fed into the LEAP once finalised.

Issue 6: Current groundwater hydrometric network is inadequate.

Contact: *David Seccombe*

Background

The Agency collects hydrometric data (groundwater level and surface water level/flow) routinely to support many of its core activities. Principally data is required to establish the state and condition of water resources, to determine current availability and to predict future availability. In addition, greater emphasis is being placed on groundwater level and low flow data to be used in strategic water management, especially during continued drought events. Whilst it is considered that the surface water network is, on the whole, adequate, the groundwater level network is not.

Unlike surface water, groundwater is hard to visualise and difficult to assess without proper infrastructure. The location, extent, slope and direction of flow cannot be understood from the ground surface without proper monitoring boreholes or wells. Groundwater may not flow in the same direction as the surface topography and can be influenced by such features as rivers, abstraction, the changes within the groundwater aquifer, as well as being controlled by the topography of the base of the aquifer.

As part of its routine monitoring programme, the Agency has many groundwater level monitoring boreholes formed by the amalgamation of a number of different networks, However this has led to some areas having better coverage than others. Key boreholes are measured monthly and the data are placed onto an archive database. It is from this database that various trends and resource availability can be reviewed and assessed.

However, the effectiveness of the groundwater level monitoring depends on the monitoring network. At present, it is considered that the monitoring network is inadequate and that the effectiveness of interpretation is impaired. This situation is accepted to be the case for all the aquifer systems within the Plan area.

Anglian Region has initiated a programme of formally reviewing the monitoring networks for all aquifers, including this Plan area. Initially, the review will determine if there is sufficient monitoring based on an agreed minimum network density. At the same time 'Research and Development' is to be advanced which will determine the ideal monitoring network based on many contingent variables. A pilot study review in the River Waveney sub-catchment has already commenced. This is due to be

reported on in July 1999. A full area review will then follow, together with recommendations for improvements, within two years.

Proposed Activities

1. Review the groundwater level monitoring network to meet optimum design.

2. Enhance groundwater level monitoring network accordingly, following review.

Issue 7: Failure to achieve water quality and biological targets at a number of sites in the plan area.

Contact: *Chris McArthur & Julia Stansfield*

Background

The water quality classification scheme, known as River Ecosystem (RE) sets chemical targets for water quality which are appropriate to the use of the watercourse. Classes range from RE1 to RE5, each one having standards set for the following parameters, dissolved oxygen, biochemical oxygen demand (BOD), ammonia, unionised ammonia, pH, dissolved copper and total zinc. In addition to the chemical scheme, a biological target has also been developed and set for each site.

A review of compliance against biological and chemical targets in the plan area has identified those sites where:

- A significant chemical failure occurs for a number of parameters, including ammonia.
- A significant failure of both the biological and chemical targets (any parameter) occurs.

Sites are listed in Table 3.1.

The reason for the failures needs to be investigated by undertaking a series of investigations including detailed data analysis and field inspections. At some sites, depending on the nature of the failure, an obvious cause may be identified against which action can be taken. At others the failures may be attributable to natural factors and variations although again this will depend on the nature of the failure.

Table 3.1 Sites identified as requiring further investigation. Overlaps with biological failures are indicated.

River name (major river catchment)	Stretch From ...To	Length (km)	RE target	Failing chemical parameters	Concerns regarding biological quality
Tas (Yare)	Old Hall Bridge to Forncett St Mary	7	3	Dissolved oxygen	Yes
Thorndon Stream (Dove)	The Wash to River Dove	3.5	3	Dissolved oxygen, BOD, Ammonia & unionised ammonia	Yes
Starston Beck (Waveney)	Tivetshall to River Waveney	14	3 3 3 3	Dissolved oxygen, BOD, Ammonia & unionised ammonia	Yes
Chet (Yare)	Poringland to Wellbeck Bridge	4.5	4	Dissolved oxygen	No
Blackwater Drain (Wensum)	Cawston to Wensum	10.0	1	Dissolved oxygen, BOD, Ammonia	No
Wendling Beck (Wensum)	Wendling to Wensum	14.0	2	Dissolved oxygen, BOD, Ammonia	No

Proposed Activities

1. Undertake a programme of investigations to determine the cause of water quality and biological failures.

2. Following the investigation, produce and implement an action plan detailing actions required to improve compliance for each stretch.

Issue 8: A number of River stretches fail to reach their biological target despite good performance against water quality targets.

Contact: *Julia Stansfield*

Background

Failure to achieve biological targets at sites where no water quality problem has been detected, using routine monitoring data, indicates that a number of other factors may be affecting the biological community at that site. Intermittent pollution of any type can be hard to detect by spot water sampling but may have a longer term effect on animals living in the river. Other types of pollution including pesticides, metals and industrial effluents, may also cause biological quality problems. Further to this, a failure against target may be recorded due to an error in the system of setting the target, an unsuitable sampling point or poor habitat.

The sites listed in Table 3.2 require further investigation to try and determine why the biological target has not been achieved. For some sites an initial assessment of the validity of the target is appropriate, whilst at others a sampling survey may be necessary to quantify and assess the extent of the problem and to identify if problems are due to pollution sources or habitat restrictions.

Table 3.2

River name (major river catchment)	Site	River Objective target (River Ecosystem)	Biological Target	Biological General Quality Assessment 1997	Trend
Foxes Beck (Ant)	Bradfield Common Br	2	b	c	Consistently fails
Ant	Swafield Br	2	b	c	Down
Tud (Wensum)	Costessey Park	2	a	b	Down
Tiffey (Yare)	Abbey Br	2	b	c	Erratic
Yare	Bramerton Woods End	3	c	b	Erratic
Yare	Coldham Hall	3	b	c	Down
Wensum	Fye Br	2	b	d	Down

Proposed Activities

1. Carry out investigations to ascertain reasons for failures.

Issue 9: Failure to achieve dissolved oxygen targets at a number of sites in the plan area.

Contact: Chris McArthur

Background

A review of long term data in the plan area has identified those sites which either have dissolved oxygen (DO) levels significantly less than the assigned target or are showing signs of deterioration; see Table 3.3.

Dissolved oxygen is critical to the maintenance of a healthy river ecosystem and although we are familiar with the disastrous effects of low dissolved oxygen levels on fish, we do not understand exactly what the critical levels are for maintenance of a healthy ecosystem. The biological data at these sites have also been examined and this found only one site in the plan area where there is an overlap between a biology failure and a dissolved oxygen failure; this is addressed in Issue 7. From the initial review of the data it would appear that there has not been a detectable detrimental effect on the biological quality (where data available) even though low dissolved oxygen levels have been recorded.

Dissolved oxygen levels in rivers are influenced by a number of factors, namely river flow, water temperature, river structures, effluents, aquatic plants and filamentous algae. We need to understand how these factors interact to control dissolved oxygen levels in rivers and to be completely sure that this is having no impact on the biology of the river. To address this we need to carry out more detailed investigations and await the outcome of an ongoing postgraduate project.

Depending on the final outcome of investigations it is possible that the control of dissolved oxygen levels will be outside of any direct action the Agency is able to take. Where a positive action is identified then we would strive to implement it. However, the costs and benefits of this would have to be evaluated particularly if it was concluded that there is no discernible impact upon the biology of the river.

Table 3.3

River name (major river catchment)	Stretch From ... To	Length (km)	DO target % sat*	Measured DO % sat**
East Ruston Stream (Ant)	Witton to River Ant	5.5	60	60
Ant	Honing Bridge to Wayford Bridge	4.5	70	55
Witton Run (Yare)	Plumstead Green to Yare	7	50	28
Bure	Buxton Mill to Horstead Mill	4	80	73
Hempnall Beck (Yare)	Hempnall to Tas	8	70	60
Chet (Yare)	Wellbeck Bridge to Lodden Mill	7	60	51
Waveney	Headwaters to Shipmeadow	75	60 60	28 34
	Beccles Yacht Station to Nth Cove Staithe		70 70 70	52 59 58
	Oulton Broad		70 70 70 70	56 57 55 60

Frenze Beck (Waveney)	Winfarthing to River Waveney	12.5	60	31
	Dickleburgh Moor to Frenze Beck		60	20
Dove	Thorndon Bridge to River Waveney	11.3	60 60 60	29 51 52

* 90 percentile target

** Calculated 90 percentile figure based on routine monitoring data period July 95 – June 98

Proposed Activities

1. Undertake a programme of investigation of failing sites, utilising output of the postgraduate project as it becomes available.

2. Following completion of the investigation and postgraduate project outlined above, assess available options and implement, as appropriate.

Issue 10: The current distribution of river reaches designated under the *EC Freshwater Fisheries Directive* does not adequately reflect the distribution of important fish stocks for which protection is required.

Contact: Robin Burrough

Background

The designations of river reaches requiring protection in accordance with the *EC Freshwater Fish Directive 78/659/EEC* have not been subject to critical review since 1986. It is known that the current designations do not include all river reaches regarded as important for their fish stocks. Consequently, these stocks are not protected to the best available standards under EC law. This Issue affects all of the catchments in the Plan area, but is also a national issue.

Proposed Activities

1. Review existing designations and identify where omissions exist.

Issue 11: Mitigation and control of eutrophication in the River Wensum.

Contact: Jo-Anne Pitt

Background

Eutrophication, the enrichment of waters by inorganic plant nutrients which results in the stimulation of an array of symptomatic changes, is now recognised to be a significant problem affecting many of the rivers and lakes in England and Wales. Changes that occur include the increased production of algae and/or other aquatic plants, which affects the quality of the water and disturbs the balance of organisms present within it. Such changes may be undesirable and interfere with water uses. In freshwater systems phosphorus is usually the key limiting nutrient and reaches the water from point sources, such as sewage treatment works, and diffuse sources, such as run off from agricultural land.

The impacts of eutrophication on river systems are diverse and at present the biological response in running waters where phytoplankton is unlikely to occur is not fully understood. However, known effects include enhanced plant growth, unsightly algal blooms leading to significant oxygen fluctuations throughout the day and ultimately a reduction of the biodiversity of the ecosystem.

These changes can interfere with or reduce the amenity value of the system.

The River Wensum, a designated SSSI, has been identified as potentially suffering from eutrophication.

In 1998, the Government designated the River Wensum as a Sensitive Area [Eutrophic] under the EC Urban Waste Water Treatment Directive, thus recognising that the river is showing the evidence of eutrophication. Phosphorus removal at Fakenham and East Dereham sewage treatment works, which contribute 45% of the point source load in the catchment, has to be in place by 2005. However, under Anglian Water Services Biodiversity Investment Programme phosphorus removal will be introduced by the middle of 1999 at both works. The issue of eutrophication is also a key feature of the River Wensum Conservation Strategy, to be published in Spring 1999 (see Section 4.5 'River Wensum SSSI Strategy').

Whilst we are beginning to tackle point source nutrient inputs the sources and the relative contribution of diffuse inputs also needs to be quantified.

Proposed Activities

1. Continue research project to establish the biological response to elevated phosphorus concentrations in rivers and to study the effectiveness of nutrient control on the River Wensum.

2. Investigate opportunities for phosphorus reduction at other major dischargers on the Wensum.

3. Endeavour to ensure that there is no increase in phosphorus load to the river from point source discharges.

Issue 12: There is concern that the microbiological quality of the rivers in the Broads area may not meet the expectations of recreational users.

Contact: *Geoff Phillips*

Background

It is clear that there is an expectation, by both holidaymakers and local people, that the recreational waters in the Broads area do not pose a risk to health. Of chief concern is the microbiological quality of river water, which due to the discharge of sewage effluents, is likely to contain elevated levels of sewage related bacteria, but an additional issue is the potential disposal of effluent from sea going vessels.

Proposed Activities

1. Assess the need for improved microbiological quality at key sites.

2. Evaluate and report on the options for improving microbiological quality at these sites.

3. Depending on findings of activities 1 and 2, promote solutions.

Issue 13: Improving EC Bathing Water quality to guideline values

Contact: *Mark Johnson*

Background

Popular coastal bathing areas exist in this catchment, with nine identified Bathing Waters, one each at Gorleston, Hemsby and Caister, three at Great Yarmouth, and three at Lowestoft. Water quality is

monitored throughout the bathing season for microbiological compliance with EC standards. The Directive sets two levels of standards; mandatory and guideline. Guideline standards are tighter than mandatory standards. To achieve compliance with the Directive the mandatory standards only have to be achieved. However, to ensure that we are working within the spirit of the Directive we should be aiming to achieve compliance with guideline standards at all Bathing Waters.

In 1998, all nine beaches satisfied the EC mandatory criteria, whilst guideline passes were achieved at Hemsby and Yarmouth North Beach. Planned upgrades to secondary treatment at Caister and Lowestoft sewage treatment works should increase the likelihood of future guideline compliance in line with the DETR's guidance of targeting key resorts for guideline quality water *(Ref. Raising the Quality, September 1998, DETR)*. Anglian Water Services' policy goes beyond this, as they are aiming for guideline quality water at all designated beaches, and have appointed a Blue Flag Project Manager to help achieve this objective. However, the relative importance of intermittent storm discharges from Yarmouth Haven needs to be assessed in relation to the issue of guideline compliance; action is currently being undertaken on this issue by the Agency and Anglian Water Services.

Proposed Activities

1. Continue to work with Anglian Water Services and local authorities to investigate methods of solving problem.

Issue 14: Nutrient control in the Rivers Bure and Ant.

Contact *Geoff Phillips & Jo-Anne Pitt*

Background

The effects of eutrophication on the Norfolk Broads are well documented and since the early 1980s point source phosphorus control at eight sewage works on the rivers Bure and Ant has been undertaken. Further reductions in phosphorus loadings to the Broads system have been recognised as being of key importance in being able to achieve restoration objectives, and during 1997, the phosphorus removal level was improved with the introduction of innovative technology at six sewage treatment works.

In 1994, the Government designated the Rivers Bure and Ant as Sensitive Areas [Eutrophic] under the EC Urban Waste Water Treatment Directive hence recognising that the system was suffering from the effects of eutrophication.

There is a continued need to ensure that the phosphorus loads are reduced wherever possible in light of the major restoration project currently being undertaken on Barton Broad (see Section 4.5 'Restoration of Barton Broad'), and the designation of the 'Ant Broads and Marshes' Special Protection Area and candidate Special Area of Conservation under EC Directives.

Whilst we are able to quantify and control nutrients in point source discharges, either through voluntary programmes or mandatory requirements, there is very little legislation available to support control of diffuse nutrient sources. To enable us to effectively tackle diffuse nutrient sources we first need to understand nutrient input mechanisms and their subsequent transport and transformation within the river system.

Proposed Activities

1. Monitor the effectiveness of improved phosphorus removal at the six sewage treatment works.
2. Monitor and report on progress with the Barton Broad restoration project.
3. Review and quantify nutrient sources in the Bure and Ant catchments.

4. Model and report on the export of phosphorus from agricultural land into the water environment and its' subsequent dynamics and transformation.

Issue 15: Minimise pollution risk to public water supply sources.

Contact: Chris McArthur

Background

Within the plan area the use of groundwater sources for public potable water supply is common-place. It has long been recognised that the Agency should be more proactive in minimising contamination risks in their catchment zones. Our aim, by a programmed series of pollution prevention visits and actions, is to minimise pollution incidents originating from point source and diffuse inputs: We have defined, by modelling, the groundwater protection zones for all significant water supply bores. At some sites the zones are within the Lying Forge, Wroxham or the River Waveney Nitrate Vulnerable Zones (NVZs) that came into force on 19 December 1998.

This philosophy also applies to surface water abstraction points with targeted pollution prevention work linked to action plans required by the EC. The Action Plans detail how we intend to improve and maintain quality at these sites. The Agency is also active in the development of new technology to monitor and protect surface water abstractions. Currently, we have automatic water quality monitoring stations on the rivers Wensum and Waveney. These provide 24 hour monitoring of simple chemical parameters (pH, turbidity, dissolved oxygen, ammonia, and conductivity) and have a proven history of warning river users of pollution incidents.

Proposed Activities

1. Design and implement a rolling programme of pollution prevention inspections for all surface and ground water abstraction catchments according to vulnerability.

2. Control and enforce nitrogen loadings in the Lying Forge, Wroxham and River Waveney NVZs, in line with the NVZ Action Programme Measures.

3. Enhance water quality monitoring stations by developments in technology at key sites and deploy mobile monitors to quantify local chemistry status, as required.

Issue 16: Impact of new development on the sustainability of the environment.

Contact: Michael Guthrie, Andrew Meddle, Chris McArthur

Background

New developments often result in a greater impermeable surface area. This in turn results in more rapid runoff, increasing the risk of localised flooding, even outside recognised floodplains. This discharge can provide a rapid throughput of pollutants direct to watercourses. The traditional methods of dealing with these problems have relied upon hard structures and pipework, which limits the ability of watercourses to act as amenity areas or areas of wildlife importance.

Other methodologies are being developed to lessen the adverse impact of new development. Clean uncontaminated surface water can be discharged to groundwater via soakaways or at a slower rate to surface systems via balancing ponds. Swales and reed beds can provide a level of decontamination for polluted waters, before being discharged. Porous surfaces allow water that would otherwise discharge to pipe, to infiltrate into the soil and potentially into groundwater. Such techniques are now being progressed under the title of 'Sustainable Urban Drainage' or 'Best Management Practices'.

For individual sites, a combination of techniques is likely to be appropriate, depending upon local conditions.

Proposed Activities

1. Promote the installation of integrated sustainable urban drainage at all new developments in partnership with County Councils, local planning authorities, Anglian Water, developers and Highways Agency.

2. Encourage early discussion at new development sites to discuss pollution risk and drainage problems.

3. Design and implement pollution prevention programme targeting problematic sites in order of priority.

Issue 17: Development proposals for disused airfields.

Contact: Michael Guthrie, Andrew Meddle, Chris McArthur

Background

There are a number of old airfield sites that are either undergoing development or are likely to be redeveloped. These sites pose a pollution risk due to their intricate unmapped drainage systems. Further pollution risk and pressure on the environment exists at sites such as Eye airfield, where significant development has taken place without provision of adequate infrastructure, such as sewerage systems.

It is likely that these sites will be centres for industrial developments in the future and this trend is evident at airfield sites such as Rackheath and Eye. At all of these locations we experienced either groundwater or surface water contamination problems that are often complex and costly to resolve. By proactive pre-planning and active pollution prevention work we believe many of these problems can be minimised.

Proposed Activities

1.Reinforce, to local planning authorities, the importance of the provision of adequate infrastructure at redeveloped airfield sites.

Also see proposed activities for the previous issue.

Issue 18: Landspreading of wastes.

Contact: Janet Cochrane

Background

The spreading of liquid industrial wastes and septic tank sludge to land for agricultural benefit or ecological improvement is exempt under Schedule 3 paragraph 7 of the *Waste Management Licensing Regulations 1994*. When wastes are applied under these Regulations to land for agricultural benefit or ecological improvement, certain information must be provided to the Agency. Present levels of pre-notification nationally are lower than expected, leading to concerns about illegal waste disposal. However, the situation in this area is of less concern since the employment of a full-time Officer dealing specifically with waste to land. Both sets of legislation are currently under review by the DETR, and we can anticipate some changes in 1999. Meanwhile, an advisory code of practice is being developed at national level in the Agency.

Proposed Activities

1. Continue to improve levels of pre-notification.

2. Carry out enforcement work (over and above routine business).

3. Increase publicity/ education and pollution prevention visits.

4. Continue to demand more accurate laboratory analysis from waste disposer.

Issue 19: Failures in fisheries biomass targets.

Contact: *Robin Burrough*

Background

A number of river stretches in the Plan area fail to achieve their fisheries biomass target class. Current failures occur on parts of the Rivers Wensum, Bure, King's Beck and Frenze Beck (tributary of the River Waveney); see Map 4 for Biomass Target Class Failures. These failures require investigation to determine the contribution to failure made by natural processes, to ensure that the target classes are appropriate and to identify any remedial measures that may be necessary.

Proposed Activities

1. Investigate failures in fisheries biomass targets, confirm that the targets are appropriate and identify remedial measures.

2. Where appropriate, implement remedial measures.

3. Continue River Wensum Rehabilitation Feasibility Study (Phases 1 & 2) targeting Fisheries Biomass Target Failures in the Wensum. Also see Section 4.5 'Delivering Integrated River Basin Management', River Wensum SSSI Strategy.

Map 4a Fish Stock Biomass Target Failures (Non–Tidal)

ENVIRONMENT AGENCY

Fails target (up to and including 1997 survey data)

Main River

Coastline

Catchment boundary

Broads area

March 1999

Map 4b Fish Stock Biomass Targets (Non–Tidal)

ENVIRONMENT AGENCY

March 1999

BIOMASS CLASSES (up to and including 1997 survey data)

- A >20g per sq m
- B 10–15g per sq m
- C 5–10g per sq m
- D <5g per sq m

- Main River
- Coastline
- Catchment boundary
- Broads area

Map 4c Fish Stock Biomass Target Classifications (Tidal & Non–Tidal)

ENVIRONMENT AGENCY

March 1999

BIOMASS CLASSES

- A >20g per sq m
- B 10–15g per sq m
- C 5–10g per sq m
- D <5g per sq m

- Main River
- Coastline
- Catchment boundary
- Broads area
- Tidal limit

Issue 20: Factors limiting Broadland fish populations.

Contact: Robin Burrough

Background

It is generally accepted that fish populations of lakes such as the Broads play a significant part in determining water quality, through their interaction with zooplankton and phytoplankton populations. Work previously conducted in the Broads and elsewhere has shown that, in phyto-plankton dominated lakes, there tend to be large numbers of zooplanktivorous fish such as roach and bream, with few piscivores such as pike and perch. In a stable ecosystem dominated by macrophtyes, clear water is maintained, at least in part, by the different structure of the fish population. The next major pivotal issue is to establish what constitutes a stable fish community in a clear water, macrophyte dominated system.

The Environment Agency is currently leading a national 'Research and Development' project titled 'Fish Populations After Biomanipulation'.

Proposed Activities

1. Review all existing fisheries work in the Broads and produce a strategy for future work to take account of the future direction of any 'Research and Development'.

2. Promote active involvement by local communities in Agency fisheries projects, ensuring their participation in the decision making process.

Issue 21: Assessment of impacts of sediments on the aquatic environment.

Contact: Charles Beardall & Robin Burrough

Background

In lowland UK rivers, especially those with high levels of flow control (through sluices and mill weirs) the fluvial sediment system has been 'neutered'; even where tributaries have retained sufficient stream power. Floodplain deposition, sedimentation around macrophytes and retention behind structures (along with the imposed flow regime) limit geomorphological effectiveness in main channels. It is thought that increasing sediment sources in arable agriculture and poor riparian management (land use, lack of buffer strips etc.) is leading to the accumulation of significant volumes of silt derived from catchments over time. This, coupled with increasing nutrient and reduced flow velocities has encouraged the growth of aquatic vegetation, further enhancing the sediment trapping efficiency of the channel. Low flows through the combined effects of climate and abstraction could be adversely affecting the flushing capacity of accumulated silt through the river systems of the lowland rivers of East Anglia.

The sources, sinks and impacts of siltation on freshwater fisheries in the LEAP area rivers have yet to be fully quantified. Although, some preliminary work was carried out on the River Waveney in early 1998.

Proposed Activities

1. Commission further appropriate studies in relevant catchments as and when funding can be made available.

2. Promotion of agri-environment schemes including the Broads ESA.

3. Assess the sources of sediment within the Wensum (this will be carried out in 1999); also see Section 4.5 'Delivering Integrated River Basin Management', River Wensum SSSI Strategy.

Also see Issue 14, Activity 4, Section 4.5 'Northern Rivers Group' and Section 4.6 'Conserving the Land, 'Norfolk Arable Land Management Initiative'.

Issue 22: Dredging and disposal of mercury contaminated sediments in the River Yare.

Contact: Geoff Phillips

Background

River Yare sediments became contaminated with mercury and copper as a result of consented discharges of trade effluent passing through the treatment process at Whitlingham STW, Norwich. These discharges were made under a trade effluent consent agreement between a large chemical plant and Norwich City Council from 1964 to 1973.

The trade effluent consent levels were reduced in the light of research in the mid 1970s.

Studies by Imperial College since 1986 have concluded that the long-term threat that the mercury contaminated sediment holds for the river system, including biota, is relatively small, provided there is no man-made disturbance.

This has obvious implications on the requirement to maintain a navigable waterway in the River Yare and associated broads and marinas. In view of the potentially damaging impact on the high profile boat industry and tourist trade in this part of Broadland, a dredging ban is considered by many to be unacceptable.

Proposed Activities

1. Produce a consultation document on the Policy for Disposal of Contaminated Dredgings using a qualitative risk assessment approach.

2. Commission a quantitative risk assessment study focusing on Brundall boat basins and marinas taking into account environmental impact of historical disposal sites.

Issue 23: Need to better understand the requirements of headwaters in the Plan area.

Contact: Charles Beardall

Background

Headwaters of rivers contribute significantly to their biodiversity. There are, for instance, many macro-invertebrates that are exclusive to, or predominantly found in headwaters (several of these species are rare). Similarly, headwaters can provide valuable habitat. Our knowledge of the status of headwaters in the Plan area, other than for fisheries, is very limited, as is our understanding of the impact of agricultural practices and headwater sewage treatment works, water quality and resource issues.

One approach to aid our understanding is the Norfolk Arable Land Management Initiative (NALMI) which is being trialed on the top of the River Yare in northwest Norfolk. This is a Countryside Conservation initiative, which the Agency is helping to promote; also see Section 4.6 for further information.

Proposed Activities

1. Assess the level of data on headwaters and identify priorities for completing species level surveys of selected headwaters.

2. Identify a strategy for the protection of headwaters, focussing on the NALMI area (headwaters of the River Yare and tributaries of the Wensum).

Issue 24: Requirement to improve and protect habitat diversity within rivers and their floodplains.

Contacts: *Charles Beardall & Robin Burrough*

Background

Until the 1970s, river management across the Region was driven by agricultural policies to improve drainage within the floodplain and hence maximise the production of cereals. These activities have resulted in the loss of many in-channel and floodplain habitats.

A number of rivers have stretches that are deficient in physical features such as riffles, pools and meanders. These stretches will need to be included in river rehabilitation programmes designed to restore habitat diversity and ecological value, whilst addressing the requirement for flood defence. Three such stretches have been identified on the River Waveney; riffle creation on the Scole, gauging station at Billingford, and pool creation at Denmark Bridge. These works have been completed, with further works planned in the near future.

Habitat enhancements are also to be progressed on the River Wensum. This work will involve co-ordinating the implementation of Action Plan targets from the Wensum SSSI Conservation Strategy, produced in partnership with English Nature, published in Spring 1999. Monitoring the ecological development of riverine habitat enhancements will also be included in these schemes.

Recent changes in land-use policies, as a result of reforms to the Common Agricultural Policy and the introduction of the Environmentally Sensitive Area (ESA) Scheme, provide the potential to restore rivers and their floodplains. The Agency will work closely with other organisations to identify areas and opportunities for floodplain habitat creation especially with regard to Broadland Flood Alleviation Scheme.

Such improvements not only increase the wildlife value of the area but can also have substantial recreational and amenity benefits, contributing to public enjoyment and understanding of this important area. (See recreation opportunities in protection through partnerships).

Proposed Activities

1. Implement river and floodplain enhancement projects as identified in feasibility study for river restoration proposals on tributaries of the River Wensum with other conservation bodies.

2. Progress habitat enhancements on the River Waveney with other interested parties.

3. Identify and undertake, in partnership, river/floodplain rehabilitation schemes and habitat enhancements, other than the rivers Wensum and Waveney, on a prioritised basis according to the benefits to be derived from the work and seize opportunities when resources become available.

4. Investigate more sustainable methods for river maintenance works. For example, explore tree planting opportunities to provide shade and reduce the need for aquatic weed cutting (appropriate sites would include those where maintenance access is not blocked and with the riparian owners' agreement).

5. Ensure flood defence works are done in a sympathetic manner, with the production and use of 'minimum environmental standards' and conservation plans, ensuring all options considered and environmental appraisals are produced.

4.0 Protection through Partnership

4.1 Introduction

The 'Protection Through Partnership' section provides the opportunity to address longer-term management issues in partnership with others. It looks at how the Agency can work with others for the benefit of the local environment. The timescales for action will depend upon our ability to work effectively with other groups, and requires a commitment from all to improve the environment.

The partnership approach is an underlying theme of the LEAP process because, although the Agency operates within an extensive regulatory framework, it is recognised that it has very little control over the mechanisms which determine land use change and, hence, pressures on the environment on a catchment-wide basis. In addition, it must be remembered that LEAPs are non-statutory documents. In order for their policies and actions to be effective, they therefore need to be incorporated into statutory documents, such as Structure Plans and Local Plans. Expert Agency advice was recently required at the Norfolk Structure Plan Examination in Public, particularly in relation to water resources.

We are currently involved in many projects and activities that rely on partnerships. Close links are already established with local authorities, water companies, industry, angling clubs, conservation bodies, port authorities, recreation and landscape bodies. New partnerships will be sought, both with these organisations and with others. It is hoped that joint funding initiatives and joint ownership of projects will provide a more secure basis for environmental protection.

Many other partnerships occur or are planned within the Agency, all of which are designed to deliver the mutual objectives of the partners involved. We have a diverse network of relationships with many national, regional and local organisations as well as landowners and the public. One significant area for future development will be the building of partnerships to aid environmental education. It is through these partnerships that we are able to fully contribute towards the goal of sustainable development.

This Section outlines some of the partnerships that are occurring, or are planned, within the Plan area.

4.2 Improving Air Quality

Air quality management.

Agency Contact: Vic Whiteley

Partners: local authorities

As mentioned in Section 2.12, local air quality planning is the responsibility of the local authorities who regulate the smaller industries and processes. However, the Agency is responsible for regulating emissions to air from major industrial processes under the regime of Integrated Pollution Control.

We will work with local authorities to ensure that Agency-driven improvements complement local authority air quality objectives. A local air quality strategy for Agency regulated processes would allow us, when formally consulted by local authorities, to contribute to local air quality plans. The Agency will also assess current monitoring programmes for our regulated processes in light of their impact on local air quality.

4.3 Managing Waste

Strategic Waste Planning

Agency Contact: Sue Innes

Partners: local authorities

The Agency inherited the charge of provision of data on waste disposal to the Regional Planning Fora from the former Waste Regulation Authorities. This involves the collection and collation of information on the types and quantities of waste going to waste facilities in a given region, and the subsequent depletion of waste management capacity. The planning forum in the Broadland LEAP area is SCEALA (the Standing Conference of East Anglian Local Authorities), which comprises of the counties of Norfolk, Suffolk and Cambridgeshire. Ultimately, the information provided by the Agency assists in the development of regional planning advice, and should also help local authorities in the preparation of Waste Local Plans.

Waste Minimisation Schemes

Agency Contact: Sue Innes

Partners: industry, local authorities, Business Link, etc.

As part of the Government's waste strategy, the Agency are taking a key role in promoting waste minimisation within industry, and in the Agency's Eastern Area a number of initiatives are either underway or at the planning stage.

We already offer advice to companies on how to reduce the use of raw materials, water and energy, as well as recycling of waste materials such as packaging waste, and intend to develop this work. The 'Waste Minimisation and Waste Management Best Practice Guide' produced by the Agency, is currently being trialed, and it is hoped that some companies in the Plan area will be involved in this. The Guide demonstrates how companies can go about establishing waste minimisation initiatives, and is supported by visits and telephone advice from Agency staff as needed.

We have developed strong ties with the East Anglian Business Environment Club and Business Link, frequently participating in events for members. For instance, we have been involved in 4 seminars in 1998 relating to waste minimisation and the Producer Responsibility Obligations (Packaging Waste) Regulations 1997.

The Agency is also a partner in the East Anglian Food and Drink Industry Waste Minimisation Project. This is a flagship project supported by European funding and led by Business Link (Norfolk and Waveney) to promote waste minimisation in all stages of the food and drink industries, from food production to processing, and finally consumption. Several companies participating are located in the LEAP area, including Colman's, Britvic, and the St Martin's Housing Trust in Norwich.

Maximising environmental benefits from Landfill Tax credits.

Agency Contact: Sue Innes

Partners: Environmental Bodies, ENTRUST

Landfill Tax is charged to landfill site operators by HM Customs and Excise. Under the Landfill Tax regulations some of this tax can be reclaimed by landfill operators, if they make contributions to approved environmental bodies. The amount reclaimed can be up to 90% of that contribution (subject to a maximum which is 20% of their annual Landfill Tax liability).

An "Environmental Body" can be any organisation whose aim is, or includes, the protection of the environment. It must support one or more of the objectives set out in the Landfill Tax Regulations.

The bodies can be established organisations or new ones set up especially to make use of the tax credits. Environmental Bodies must enrol with the regulator (ENTRUST).

At the discretion of the landfill industry, nationally up to £100m per year could be channelled into Environmental Bodies. There is enormous potential for benefits to the environment to be achieved from these funds through collaborative work and partnerships. In relation to the Agency's functions, such projects could include general habitat improvement and restoration schemes, recreation improvements, conservation projects, and waste minimisation initiatives.

Fly-Tipping

Agency Contact: Sue Innes

Partners: local authorities, police

The introduction of the landfill tax in September 1996 has increased the pressure on the environment through the illegal disposal of wastes. Local authorities and the Environment Agency have seen an increased prevalence of illegal dumping in recent months and a continued problem of fly-tipping within the Plan area, although there is a lack of reliable data on this. We aim to work with the Police and local authorities to try to eliminate this problem. To aid our work in this activity a Memorandum of Understanding has been signed with local authorities detailing who should deal with different scales of fly-tipping incident.

Litter

Agency Contact: Sue Innes

Partners: local authorities, Tidy Britain Group

Although each local authority has specific responsibilities for litter control and clearance, the Agency continue to work with them, on tidal sections of beaches, to implement strategies to minimise this problem. Liaison with local authorities to share this workload continues and efforts are concentrated at the most popular or impacted sites.

4.4 Managing our Water Resources

Development and Water Supply/Water Conservation

Agency Contact: David Seccombe

Partners: water companies, local authorities, developers, landowners, farmers

The Agency liaises with water companies, in order to manage water resources in the Plan area and to ensure that both demand management and demand forecast plans are appropriate. Within this framework and in conjunction with our abstraction licensing system the Agency regulates the water companies, farmers and other abstractors to achieve the proper balance between the needs of the environment and other water users. Where water resources are fully committed then water could be supplied from elsewhere. However, the full impacts and costs of this will need to be assessed to ensure sustainability. If additional finance, capital, investment or infrastructure are necessary, then these costs will ultimately be borne by the developer and water company customers. It is also vital that development does not proceed ahead of due consideration to social and environmental costs. The Agency will work with the water supply companies and local authority planners to ensure that all costs and implications of development are balanced against the need for sustainable water supplies. We will want sustainable water supplies to be agreed and demonstrated before development takes place.

The Agency does place great emphasis on demand management especially where this will reduce pressures on the environment or prevent the need for the development of new resources. We encourage measures such as the water company's leakage control and metering programmes and initiatives to build water conservation into new developments, for example through installation of low water-use appliances. We will also work actively to discuss and consider alternative sources of supply, including aquifer storage and recovery, augmentation of treated sewage as well as desalination.

4.5 Delivering Integrated River Basin Management

Recreational Opportunities

Agency Contact: Amanda Elliott

Partners: Countryside Management Projects, local authorities, Broads Authority, riparian owners, others

The Agency seeks to contribute towards the development of public amenity in a way that complements its statutory duties and responsibilities.

We work closely with many countryside management projects which are described elsewhere in this section. There is a further need to work with riparian owners and other agencies to promote appropriate access to and along riverbanks, including disabled access.

The Agency owns a small amount of land within the plan area and looks to develop the recreational potential of such areas.

There is also a need to further work with the Broads Authority to enhance appropriate facilities including access for anglers, as bankside angling, including competition fishing which is a very popular recreation on Broadland rivers. It is proposed that a strategy is developed in conjunction with the Broads Authority to provide adequate access for angling which takes account of other recreational users and amenity, and conservation.

Two schemes are proposed for 'North Walsham and Dilham Canal' and 'Bungay to Geldeston Lock' on the River Waveney, which could have benefits for canoeists, anglers, cyclists and walkers. Other proposed schemes include canoeing improvements to the River Bure and a recreational scheme on Upper River Waveney at Diss. These have been identified in the feasibility study for the River Waveney Regeneration Project.

These schemes will need to work in close consultation to ensure that other river needs, e.g. flood defence, navigation and wildlife are taken into account.

Redgrave and Lopham Fen

Agency Contact: Charles Beardall & Alan Hull

Partners: Essex & Suffolk Water, English Nature, Suffolk Wildlife Trust

The Agency has entered into a collaborative project with the above parties to restore Redgrave and Lopham Fen's hydrology to its pre 1950s state and establish the input of nutrients from surface waters into the Fen, prior to the influence of public water supply abstractions and land drainage activities.

Surveys of the fen soils have been carried out but there is currently little data on the nutrient levels of surface waters entering the Fen. The Agency is in the process of setting up and agreeing a monitoring programme with its partners.

It is currently intended to carry out monitoring for a year after which the results will be evaluated and decisions made regarding further actions and/or investigations.

This project has attracted EU LIFE funding. Work is well progressed in relocating the public water supply source away from the Fen along with improvements to land drainage and extensive fen management.

Northern Rivers Group

Agency Contact: Charles Beardall

Partners: Broads Authority, English Nature

A project group was formed to establish a consensus on priorities for management of the Bure, Ant and Thurne (Northern Rivers of the Broads). The project aimed to draw together the key statutory organisations responsible for managing the environment to form a consensus on the most important issues that need to be addressed, for example; freshwater flow (see Issue 4), water supply to fens and marshes (see Issue 5), eutrophication (see Issue 11), fisheries management, forward planning in a catchment context, economic evaluation and recreation . The project group also seek to agree management objectives for the future and to explore the options for a more sustainable management strategy.

Upper Waveney Valley Project

Agency Contact: Merle Leeds

Partners: local authorities, Broads Authority, landowners, farmers, local recreational users e.g. angling clubs, horse riders etc.

This is a project set up to consider recreational, tourism and environmental issues. Applying for Objective 5b funding for Suffolk, for recreation and environmental tourism. The aims of this project are:

- to maintain and enhance the character of the landscape
- to improve opportunities for public access to the countryside and for quiet recreational pursuits
- to protect and enhance wildlife habitats
- to protect historical landscapes and archaeological sites
- to increase local community and visitor awareness and understanding of the countryside
- to give advice and support to enable people to become involved and co-ordinate the activities and resources of private, public and voluntary organisations.

Wensum Valley Project

Agency Contact: Charles Beardall

Partners: local authorities, Farming & Rural Conservation Agency, Norfolk Wildlife Trust, National Farmers Union, Norfolk Angling Conservation Association, Internal Drainage Board, landowners, farmers

The aim of the countryside management project remit is to protect and enhance landscape, wildlife, recreation, and archaeology and to encourage public access to the countryside. Projects completed in 1997/8 include practical habitat improvement, e.g. at Hoe Common, and construction of a path to allow disabled access to the river at Gunton Lane Recreational Area Costessey.

Trinity Broads (Ormesby, Rollesby, Ormesby Little and Filby) Restoration

Agency Contact: Geoff Phillips/Jo Anne Pitt

Partners: Broads Authority, Essex & Suffolk Water

The Trinity Broads are a series of four interconnected lakes located in the North East of the plan area. All are heavily utilised, Ormesby Broad for public water supply and angling, the other three, Rollesby, Ormesby Little and Filby Broad, for sailing and angling. The lakes have no direct major inflow but are fed by ground water and a series of drainage dykes. However, the hydrology of the system is poorly understood and recently levels in the Trinity Broads have been fluctuating significantly. It is the Agency's intention to investigate the cause of these fluctuations in water levels.

The lakes show symptoms of nutrient enrichment with planktonic algae dominating during the summer months. Blue-green algal blooms are also a common feature and this has prevented sailing activities from taking place on occasions.

Since 1995 a number of initiatives have been undertaken in the three Broads in partnership with Essex & Suffolk Water and the Broads Authority. This has included a biomanipulation project in Ormesby Broad, a study of the nutrient inputs from the catchment and establishing a long term blue green algae monitoring site at Filby Broad as part of the National Blue Green Algae Monitoring Programme. These activities are continuing.

The Trinity Broads were notified as a Site of Special Scientific Interest (SSSI) on the 24 August 1998 due to their rich assemblage of aquatic plants, wet carr woodland, swamp communities, breeding and wintering birds and invertebrates, including many which are nationally rare or scarce.

The Agency will also carry out an agricultural pollution prevention campaign in the Trinity Broads' catchment to encourage best practise, particularly with respect to nutrient control.

Restoration of Barton Broad

Agency Contact: Jo-Anne Pitt

Partners: Broads Authority, Millennium Commission, Broads Authority, Anglian Water, and the Soap and Detergent Industry Association's Environmental Trust

The restoration of Barton Broad is being undertaken as a partnership project led by the Broads Authority. Work is taking place over a five-year period to remove phosphorus enriched sediment from the broad. In combination with improved phosphorus removal at sewage treatment works upstream this should result in an improvement in water quality. Additional work to improve the marginal vegetation of the broad and the creation of clear water by biomanipulation of some areas is also being carried out.

The Environment Agency is closely monitoring the results of this project, which is being funded by the Millennium Commission, Broads Authority, Anglian Water, and the Soap and Detergent Industry Association's Environmental Trust.

Accord between the Association of National Park Authorities & the Environment Agency

Agency Contact: Charles Beardall

Partners: Association of National Park Authorities

The Environment Agency and the Association of National Park Authorities acting for all the National Parks and the Broads Authority signed an Accord in September 1996 committing each organisation to co-operate in aiming for the highest standards of environmental quality and sustainability in the National Parks and the Broads.

In particular the two organisations will work closely together on:

- preparing statutory and non-statutory plans;
- implementing conservation programmes, including the UK Biodiversity Action Plan;
- developing opportunities for understanding and enjoyment;
- promoting awareness of their actions by local communities;
- research, data exchange and training.

Quite specifically the Accord declares that all the land and water within the National Parks and the Broads is of special importance for the purpose of the Section 8 of the Environment Act – ensuring consultation with the National Park Authority on any proposed work by the Agency.

River Wensum SSSI Strategy

Agency Contact: Charles Beardall

Partners: English Nature

In August 1995 a Memorandum of Understanding was signed by English Nature and the Environment Agency which stated that agreed Conservation Strategies and Consenting Protocols would be produced for each river SSSI. For example, the River Wensum is one of 27 rivers in England which have been designated as Sites of Special Scientific Interest (SSSIs) by English Nature. The overall purpose of this Conservation Strategy is: to identify the factors which impact on the plant and animal communities for which the River Wensum has been designated of special interest; to agree on key conservation issues which need to be addressed, and to list (and prioritise) the actions which are required to maintain and enhance the special scientific interest of the river. Issues 4,11,20,23, 24 and Section 4.5 'Water Level Management Plans' include examples of some of the issues and activities put forward within the Strategy.

The Strategy also aims to meet the following specific objectives:

- To summarise and evaluate the conservation interest of the river.
- To identify the activities and types of management which are found on the river.
- To assess the impact of these activities on the conservation interest.
- To establish a rationale for regulation of activities on the river.
- To identify targets for the conservation of the river, with a timetable for action for the next five years.
- To identify the responsibilities of English Nature and the Environment Agency in implementing these targets.

Norwich Fringe Project

Agency Contact: Charles Beardall

Partners: Norwich City Council, Norfolk County Council, Countryside Commission, Norfolk Wildlife Trust, British Trust of Conservation Volunteers, South Norfolk Council, Broads Authority, MAFF, National Farmers Union, Country Landowners Association, landowners, farmers

The aims of this project are:

- to provide opportunities for public access and quiet recreational pursuits in Norwich fringe;
- to encourage the involvement of local people in the work and development of the project;
- to increase understanding and appreciation of area;
- to maintain and enhance the physical character of the Norwich Fringe Landscape;
- to protect and improve wildlife and archaeological sites in areas accessible to general public.

Norwich River Corridor Enhancement Strategy

Agency Contact: Charles Beardall, Robin Burrough

Partners: Norwich City Council, Norwich Fringe Project, Broadland District Council, Countryside Commission, Norfolk Wildlife Trust, British Trust of Conservation Volunteers, Wensum Valley project, English Nature, South Norfolk Council, Government Office for Eastern Region, Broads Authority, landowners, farmers

Norwich has been chosen to develop one of the first national river corridor enhancement strategies. The Countryside Commission is supporting the preparation of a strategy for the river valleys in the Norwich area and its use as a first national pilot strategy of its kind. The Countryside Commission has committed itself for a three-year period, not only to produce the strategy but to also implement a number of practical enhancement works. It is proposed that the strategy is based primarily on the River Wensum from Trowse to Ringland, the River Yare from Bawburgh to Postwick, the River Tas to Caistor St Edmund and the River Tud from Norwich.

The focus of this Strategy is to provide a platform for public access in the countryside in a cohesive manner, whilst enhancing the visual qualities of the landscape and recognising the need to protect more sensitive sites from a wildlife and planning perspective. Its particular value is that it is a joint collaborative initiative between all agencies that have powers and interests in the urban fringe of Norwich.

At this stage, a draft document has been produced to help guide the future protection and enhancement of the river valleys in and near the City of Norwich. Long distance walks have been established along the rivers Yare and Wensum.

The Agency will participate as a member of the Norwich River Strategy Working Group and provide technical and financial assistance with the Strategy.

Pollution Prevention Inspections

Agency Contact: Chris McArthur

Partners: farmers, National Farmers Union, MAFF, other farming groups, landowners, industry, water companies

A major activity for Environmental Protection teams within this LEAP area is pollution prevention inspections to agricultural and industrial premises.

Our programmes concentrate on areas of known pollution problems, high livestock densities and the catchments for public water supply boreholes or surface water intakes. Much of this work is undertaken in partnership, with the co-operation of key interest groups such as those listed above.

This work has the strategic aim of minimising environmental pollution by controlling direct inputs into ground and surface waters, as well as reducing pollution incidents.

The pollution prevention programme continues as a five-year rolling schedule with the current programme of visits placing emphasis on impacts from the construction and oil industries. Implementation of this programme of work is not possible without the assistance and involvement of the key partners. The Agency has a good record of achieving results in this area by co-operation and not legislative emphasis. A continued partnership approach is our preferential way forward for the future.

Contingency planning for large scale oil spills

Agency Contact: Chris McArthur

Partners: Marine Pollution Control Unit, local authorities, Harbour Authorities

The Agency has a clear duty in preventing ingress of oil into estuarine systems under the Government's Marine Oil Spill National Contingency Plan.

The Agency works in partnership with other key players such as the Marine Pollution Control Unit, Local and Harbour Authorities to prepare local plans that are co-ordinated by County Councils in their County Oil Spill Plans. Experience has shown that oil could enter estuaries and Broadland from an offshore spillage or from an incident within the port. There is a need to draw up detailed plans and carry out exercises on a regular basis. In particular there is a need to implement Memorandum of Understandings at Great Yarmouth and Lowestoft ports.

Coastal Protection

Agency Contact: Clive Flanders

Partners: local authorities, Harbour Authorities.

Within the framework of the Shoreline Management Plan (see Section 2.15), we are continuing to encourage liaison opportunities with the relevant District Councils who have responsibilities for coastal defences under the *Coast Protection Act 1949*. This will ensure that our respective coastal management and sea defence activities are complementary and do not have any adverse effect on adjacent frontages.

Water Level Management Plans

Agency Contact: Paul Rouse

Partners: English Nature, local authorities, Wildlife Trusts, RSPB, Farming & Rural Conservation Agency (FRCA), Broads Authority, landowners & occupiers

The implementation of Water Level Management Plans (WLMPs) requires partnerships between all individuals and organisations who have an interest within a plan area. As the 'operating authority', the Agency has in place 12 WLMPs for parts of the LEAP area.

We aim to integrate the views of all the relevant interests at the site to ensure that a balanced and sustainable water level regime is adopted. Other operating authorities are also producing WLMPs and we work closely with these bodies, to ensure full consultation and appropriate objectives are reached. The implementation of the WLMPs objectives depends upon the approval and co-operation of all the relevant interests and initiatives for joint funding between the interested parties to ensure that these wetland conservation sites are protected and enhanced.

The major priority for the WLMP programme was the completion of the majority of the Plans by the MAFF deadline of the end of 1998. The priority Plan is the progression and completion of the River Wensum WLMP. To make these Plans 'useful, working documents' it is imperative for us to progress the key objectives in collaboration with organisations such as English Nature and the FRCA. By the end of 1998 we produced Final Plans for 43 out of 52 sites within the Agency's Anglian Region Eastern Area, many of which will be in need of reviewing. The remaining nine plans have been carried forward into 1999 and it is anticipated that they will be completed by April. All of these sites are of International importance for their conservation interest, designated as either candidate Special Areas of Conservation, Special Protection Areas or both. The importance of progressing these objectives is therefore vital.

4.6 Conserving the Land

Development

Agency Contact: Michael Guthrie

Partners: local authorities

The Agency is a statutory consultee in the development plan process. We use this to promote sustainable development at a local level, and aim to get policies for protection of the natural environment into statutory plans. County and Local Authority planners seek Agency advice on water resources, flood risk, waste, water quality and air quality to enable them to sustainably allocate new developments. Meetings have been held with Suffolk County planners to identify at an early stage any environmental issues relating to new strategic allocations. Agency staff have also assisted local planners (e.g. Norwich) in identifying constraints on potential housing and employment allocations.

As a statutory consultee under Town and Country Planning legislation, the Agency seeks to ensure that local planning authorities are aware of the environmental implications of an individual development when deciding on whether to grant planning permission. In some cases we will ask the local planning authority to impose conditions on a development, to ensure that impacts on the environment are acceptable. We will endeavour to work with the relevant local authorities to ensure that any development is sensitive to the needs of the local environment.

Under Section 105 of the Water Resources Act 1991, the Agency has a duty to produce maps of flood risk areas for use by local authorities in their development plans to prevent inappropriate development in the floodplain. Priority areas within the LEAP area are the coastal and tidal frontages and developed areas along 'main river', in particular Norwich. There is still a large amount of survey work to be completed. Each river valley needs to be surveyed with full, detailed hydrometric mapping taking place.

Norfolk Arable Land Management Initiative

Agency Contact: Charles Beardall and Chris McArthur

Partners: Countryside Commission, Morley Research Centre, landowners, farmers

As mentioned in Issue 23, the Norfolk Arable Land Management Initiative is being trialed on the top of the River Yare in northwest Norfolk. It is a three-year agri-environment scheme looking at promoting extensification within the agricultural landscape. The aim is to deliver sustainable land management in arable areas which protects environmental quality and improves the economic viability of the business involved

The launch of this innovative scheme in partnership with the Countryside Commission has many integrated potential benefits to the environment. It is proposed that holistic farm environmental management will be encouraged by use of incentives and detailed advice from experts in this field. Initial meetings with the farmers have found a willingness to sign up to this scheme, one of five trials of this concept in the UK.

Although this scheme was chosen principally for its arable impacts on the environment, it is now known that a significant pig and dairy population exist in the target area (covering fifteen parishes in the upper Yare and Wensum).

The Agency has linked objectives to the Countryside Commission and include minimising diffuse inputs (nutrients and pesticides), use of buffer strips, controlling wastes from livestock holdings (including outdoor pigs) and enhancing wildlife habitats and species.

Contaminated land

Agency Contact: Simon Wood

Partners: local authorities, landowners

If land is contaminated by harmful substances, it may pose a risk to human health, surface and ground water, ecosystems, man-made structures and services, and land use. The extent and nature of land contamination in any area is a legacy of its industrial and urban development. Urban areas generate the most solid waste, most of which has been, and is still, disposed to landfill sites. Past industrial and waste disposal practices were subject to fewer controls than at present, and land contamination has also occurred through accidental spillage and casual disposal practices.

One of the Agency's principle aims is to "secure, in co-operation with others, the remediation of contaminated land". The Agency recognises that this can only be achieved by working in close partnership with local authorities. Section 57 of the Environment Act 1995, once implemented, will provide new powers and responsibilities for local authorities and the Agency regarding the identification and remediation of sites which meet the statutory definition of contaminated land. Until such time, the extent and nature of contaminated land cannot be determined from existing sources of information.

4.7 Managing our Freshwater Fisheries

Fisheries Enhancement Projects

Agency Contact: Robin Burrough

Partners: Angling Clubs and Fisheries Owners

Opportunities for the Agency to join with or assist Angling Clubs and Fishery Owners in the design and implementation of management actions or schemes arise very frequently, particularly with respect to stillwater fisheries. The extent of the Agency's involvement is very variable, and can range from straightforward verbal advice to the deployment of staff and/or equipment to provide direct practical assistance with fish stock assessment or fish removals/transfers.

Every effort is made to ensure that good quality fisheries management advice is always available, and that any fish stocks under threat from water loss or pollution are rescued as appropriate. However, it is not always possible to take up potential opportunities for other practical involvement, because of the large number of cases that arise. Priority is given to public and angling club waters, rather than to those in private ownership. The Agency will also seek to investigate (and provide appropriate advice) in all reported cases of fish mortality and fish disease. Every year, a considerable number of fisheries benefit from these arrangements, which form a key element of the overall fisheries service.

Fisheries Management partnerships have been developed to fund fish habitat enhancements on the Rivers Bure, Waveney and Wensum. Fishery management advice and stocking of a major new public access stillwater fishery at Bawburgh, near Norwich was completed in early 1998. The Agency is also involved with partnership projects surveying the status of key scarce species of international importance (e.g. otter and native crayfish). In addition we have contributed to a University of East Anglia research project investigating the habitat requirements of the bullhead (EC Habitats Directive listed species) in Norfolk rivers.

Netting of sea trout along the Norfolk coast, identification of unlawful activities and monitoring East Coast fishing for migratory salmonids

Agency Contact: Chris Window

Partners: MAFF, Eastern Sea Fisheries Joint Committee

A Net Limitation Order for the East Coast Fishery, proposed by the Agency in support of its policy of phasing out migratory salmonid fisheries exploiting predominantly mixed stocks, was confirmed by MAFF following a Public Inquiry in May 1995. The Order came into effect on 1 January 1996, from which date net licences could only be issued to fishermen who held licences in 1995. As existing licensees leave the fishery, no new licences will be issued, reducing the number of licenses and ultimately eliminating the fishery.

In order to monitor the netting of sea trout along the coast we are arranging a Service Level Agreement with the Eastern Sea Fisheries Joint Committee. They are currently authorised to monitor the Net Limitation Order as part of their routine monitoring program, but we intend the agreement to increase bailiff activity and the total number of authorised bailiffs. It is envisaged that this will identify unlawful activity and monitor East Coast fishing for migratory salmonids.

Comprehensive strategy for angling in the Broads

Agency Contact: Robin Burrough

Partners: Angling groups, Broads Authority

A need has been identified for a comprehensive strategy for angling in the Broads. This would aim to serve the dual role of meeting the present and future needs of anglers in the Broads, while minimising the possibility of conflict with the interests of other Broads users.

Phase 1 of the strategy to be implemented, outlines the nature of the resource and how it is used. This will be supplemented by information on how angling conflicts with the needs of other interests. We will then take forward information provided by Phase 1 and commence Phase 2. Phase 2 will concentrate on strategic options for the solution of angling related problems; how angling interests may be enhanced, the production of site specific management plans and looking towards providing better information to anglers.

4.8 Enhancing Biodiversity

Biodiversity Action Plans

Agency Contact: Charles Beardall

Partners: English Nature, local authorities, Suffolk/Norfolk County Councils, Suffolk Wildlife Trust, Norfolk Wildlife Trust, RSPB, Biological Research Centre, Broads Authority, landowners, farmers, Internal Drainage Boards

An important priority is completing Local Biodiversity Action Plans (BAPs) with County partners and assessing the implications of Biodiversity Species and Habitat Plans on Environment Agency activities.

As part of the Agency's input into Local Agenda 21 we are part of the Anglian Regional Biodiversity group aimed at translating the national initiative of biodiversity into a Regional context. At a local level local authorities and environmental organisations, including the Environment Agency, are compiling the Norfolk and Suffolk Biodiversity Action Plans with specific targets for habitats and species, many of which are relevant to this area. We are in a key position to influence many of these targets since Action Plans will be concerned with coastal habitats, wetlands and aquatic species (i.e.

reedbeds, brackish lagoons, otter and crayfish). As such we are playing an active role in the production of the Biodiversity Action Plan and taking on specific responsibility to progress Action Plans for key species and habitats. The Agency is the contact point for the following species in the plan area; Water Vole, Otter, Fresh Water White Clawed Crayfish, Shining Ramshorn Snail and Depressed River Mussel. Actions include initiating and continuing surveys for key species. Note that surveys have already been completed for otter, water vole and crayfish. The conservation of biodiversity will be an important indicator of the successful implementation of sustainable development in the Plan area.

At the time of this Plan going to print, the first tranche of the Suffolk BAP has been produced, and the Norfolk BAP was launched in January 1999 for consultation.

The Agency will continue development and implementation of the Suffolk & Norfolk BAPs with other interested parties. Specific activities that the Agency are undertaking include:

- The monitoring of species and habitats targeted as priorities in the biodiversity initiative.
- Raising awareness of requirements of priority species and habitats within the Agency and externally, e.g. Shining Ramshorn snail.
- Completing surveys for key freshwater invertebrates, starting on the River Wensum SSSI in Spring 1999.
- Further collaborative research into specific requirements of key species see 'Fisheries Enhancement Projects', Section 4.7.

4.9 Further examples

Local Agenda 21

Agency Contact: Michael Guthrie

Partners: local authorities

Local Agenda 21 (LA21) has been adopted to ensure that sustainable development is achieved on a local scale. Within the Broadland Rivers Plan area, LA21 is at varying stages of production although the Government has requested that all local authorities have a plan in place by the year 2000. The future involvement of the Environment Agency on these issues will very much depend on the status of LA21 within each of the local authority areas.

Because so many of the problems and solutions being addressed by LA21 have their roots in local activities, the participation and co-operation between local authorities and the Agency will be of vital importance. The Environment Agency will, where practicable and relevant to our work, provide environmental information and work with others to achieve the objectives of sustainable development. We intend to support and contribute towards LA21 initiatives within the Plan area. The Consultation Report and the consultation period within the Plan process, positively reinforces the message of building partnerships, emphasising the importance of local action and assisting with achieving a greater sense of continuity.

Environmental Education

Agency Contact: Nicole Ashdown

Partners: Business, Industry, local authorities, schools, Suffolk Wildlife Trust, Norfolk Wildlife Trust, Broads Environmental Education Network, Broads Authority, SATRO, How Hill Trust, NFU, CLA, others

Environmental education is a central means of furthering our commitment to sustainable development. Education offers people the potential to address environmental issues, which is vital to achieving a sustainable society. Education in its broadest sense means personal awareness,

experience and interest developed over a period of time, whether at home, school, college or university, at work, or in the wider community.

The Agency considers environmental education to be vital and we are actively developing an education service to help schools and colleges at all levels of the curriculum. We encourage local liaison and project-related work in the environment and provide several resource packs and data sets for students to use within their studies. For instance, we have recently distributed a CD-ROM package to a wide selection of Junior Schools in the Anglian Region, called 'Greener Futures'. This package forms a 'Lifestyles and Environmental Audit' project with questionnaires and an extended interactive environment, including various games and tasks. This package was created in partnership by the Environment Agency, Cambridgeshire County Council, the DETR and Peterborough Environmental City Trust.

We are also involved, and actively supporting, the 'Eco-Schools award scheme' which enables schools to extend environmental lessons outside the classroom and apply them to the day-to-day running of the schools. The Eco-Schools award scheme can help schools to: improve the school environment; reduce litter and waste; reduce fuel and water bills; increase environmental awareness; involve the local community; gain business sponsorship; gain local publicity; and, create links with other schools in the UK and Europe.

Another award scheme to be launched in Norfolk in by mid 1999 is the CREST (CREativity in Science and Technology) Awards Scheme which is primarily aimed at secondary schools and colleges both for curricular and non-curricular project work. The scheme provides an opportunity for students to gain recognition for their work and has four levels of achievement; bronze, silver, gold and platinum reflecting increasing levels and depths of input. The Network of Science and Technology Regional Organisations (SATRO) manage and organise the scheme. The latest programme available in the CREST Awards Scheme is the Environmental Research Challenge which is sponsored by three partners (the Environment Agency, the Natural Environment Research Council and Unilever plc) who all have an intrinsic interest in sustainable development.

It is also part of our routine business to promote environmental education in other sectors of society, including business and industry, local authorities and other key players. The LEAP process positively contributes towards education in a fundamental way. The Agency also undertake pollution prevention visits, attend road shows, such as that held at the Felbrigg Hall Woodland Open Day in Autumn 1998, science fairs, provide speakers, distribute educational documents and generally work in a pro-active way to protect the environment.

Appendix A: Duties, Powers and Interests of the Environment Agency

The Environment Agency has a wide range of interests in the areas of water management, waste management and pollution prevention and control. Whilst many of these interests are supported by statutory duties and powers, much of our work is advisory, with the relevant powers resting with other bodies such as Local Planning Authorities, for example we are not responsible for:-

- noise problems (except if it is to do with our work)
- litter (unless it is restricting the flow of a river)
- air pollution arising from vehicles, household areas, small businesses and small industry
- collecting waste in your local area
- planning permission
- environmental health
- food hygiene

These are all dealt with by your local planning authority who will contact us if necessary.

We are not responsible for the quality or supply of drinking water at the tap or for treating sewage waste, although we regulate discharges from sewers and sewage treatment works.

The following table is a simplified summary of our duties, powers and interests and their relationship to land-use planning.

Water Resources: The Agency has a duty to conserve, redistribute, augment and secure the proper use of water resources.		
The Agency has powers to:	**The Agency has an interest (but no powers) in:**	**Partnership**
• Grant or vary water abstraction and impoundment licences on application. • Revoke or vary existing licences to reinstate flows or levels to surface-waters or groundwater which have become unacceptably depleted as a result of abstraction, and are subject to a liability for compensation. • Secure the proper use of water resources through its role in water-resources planning, the assessment of reasonable need for abstractions and promotion of more efficient use of water resources. • Monitor and enforce abstraction and impoundment licence conditions.	• The more efficient use of water by water companies. developers industry, agriculture and the public and the introduction of water-efficiency measures and suitable design and layout of the infrastructure.	The Agency is committed to water-demand management and will work closely with water companies and developers, local authorities and relevant organisations to promote the efficient use of water. The Agency acknowledges that new resources may be needed in the future and supports a twin-track approach of planning for water resource development alongside the promotion of demand-management measures. The Agency seeks to influence planning decisions for new development by encouraging the inclusion of water-conservation measures in new properties, particularly in areas where water resources are under stress, and by ensuring that planning authorities allow for the lead time for resource development.
Flood Defence: The Agency has a duty to exercise general supervision over all matters relating to flood defence throughout each catchment.		
• Control, through Land Drainage consents, development or construction of a structure that would affect the flow of an ordinary watercourse (Water Resources Act, 1991 Section 109, Land Drainage Act, 1991 Section 23). • Produce flood risk maps for all main rivers under S105 of Water Resources Act 1991. • Undertake works to main rivers using permissive powers. • Issue flood warning relating to main river to the public, local authorities and the police. • Consent mineral workings within 16 metres of main rivers.	•Granting of planning permission throughout a catchment but especially floodplains where development can significantly increase flood risk. This permission is granted by Local Planning Authorities. •Installation of surface water source control measures e.g. flood attenuation structures. •Supervising the maintenance of ordinary watercourses which is a Local Authority remit, but may impact on main rivers. •Installation of buffer zones which reduce flood risk and have significant environmental benefits. •Urban and rural land use and measures that can reduce flood risk or the need for watercourse maintenance.	As a statutory consultee on planning applications within main-river floodplains, the Agency offers advice based on knowledge of flood risk. It also advises on the environmental impacts or proposed floodplain development. The Agency will encourage best practice, including source-control measures and common standards, among Local Authorities and riparian owners to protect and enhance the environment. The Agency works with the civil authorities to prepare flood-warning dissemination plans and supports their endeavours to protect communities at risk.

Water Quality: The Agency has a duty to monitor, protect, manage and, where possible, enhance the quality of all controlled waters including rivers, groundwaters, lakes, canals, estuaries and coastal waters through the prevention and control of pollution.		
• Issue discharge consents to control pollution loads in controlled waters. •Regulate discharges to controlled waters in respect of water quality through the issue and enforcement of discharges consents. •Prosecute polluters and recover the costs of clean-up operations.	• The control of runoff from roads and highways. This is a Highway Agency duty. •_The greater use of source-control measures to reduce pollution by surface-water runoff. • Prevention and education campaigns to reduce pollution incidents.	The Agency will liase with Local Authorities, developers, the Highways Agency, industry and agriculture to promote pollution prevention and the adoption of source-control measures As a statutory consultee on planning applications, the Agency will advise Local Planning Authorities on the water-quality impact of proposed developments.
Air Quality: The Agency has a duty to implement Part 1 of the Environment Protection Act 1990.		
•Regulate the largest technically-complex and potentially most polluting prescribed industrial processes such as refineries, chemical works and power stations including enforcement of, and guidance on, BATNEEC and BPEO. •Have regard to the government's National Air Quality Strategy when setting standards for the releases to air from industrial processes.	• The vast number of smaller industrial processes which are controlled by Local Authorities. •_Control over vehicular emissions and transport planning.	The Agency provides data on IPC processes and advice on planning applications to Local Authorities. The Agency is willing to offer its technical experience to Local Authorities on the control of air pollution The Agency wishes to liase with Local Authorities in the production of their Air Quality Management Plans. The Agency will advise and contribute to the government's National Air Quality Strategy
Radioactive Substances: The Agency has a duty under the Radioactive Substances Act 1993 to regulate the use of radio-active materials and the disposal of radioactive waste.		
• To issue certificates to users of radio-active materials and disposers of radio-active waste, with an overall objective of protecting members of the public.	• The health effects of radiation.	The Agency will work with users of the radio-active materials to ensure that radioactive wastes are not unnecessarily created, and that they are safely and appropriately disposed of. The Agency will work with MAFF to ensure that the disposal of radioactive waste creates no unacceptable effects on the food chain. The Agency will work with the Nuclear Installations Inspectorate to ensure adequate protection of workers and the public at nuclear sites. The Agency will work with the HSE on worker-protection issues at non-nuclear sites.
Waste Management: The Agency has a duty to regulate the management of waste, including the treatment, storage, transport and disposal of controlled waste, to prevent pollution of the environment, harm to public health or detriment to local amenities.		
•Vary waste management licence conditions. •Suspended and revoke licences. •Investigate and prosecute illegal waste management operations	.•The siting and granting of planning permission for waste management facilities. This is conducted by the waste industry and Local Planning Authorities. The Agency, as a statutory consultee on planning applications, can advise on such matters.	The Agency will work with waste producers, the waste-management industry and local authorities to reduce the amount of waste produced, increase reuse and recycling and improve standards of disposal.
Contaminated Land: The Agency has a duty to develop an integrated approach to the prevention and control of land contamination ensuring that remediation is proportionate to risks and cost-effective in terms of the economy and environment.		
• Regulate the remediation of contaminated land designated as special sites. •Prevent future land contamination by means of its IPC, Water Quality and other statutory powers. • Report on the state of contaminated land.	•Securing with others, including Local Authorities, landowners and developers, the safe remediation of contaminated land.	The Agency supports land remediation and will promote this with developers and Local Authorities and other stakeholders.
Conservation: The Agency will further conservation, wherever possible, when carrying out water-management functions; have regard to conservation when carrying out pollution-control functions; and promote the conservation of flora and fauna which are dependent on an aquatic environment.		
• The Agency has no direct conservation powers, but uses its powers with regard to water management and pollution control to exploit opportunities for furthering and promoting conservation.	• The conservation impacts of new development. These are controlled by Local Planning Authorities. • Protection of specific sites or species, which is a function of English Nature. The Agency does, however, provide advice to Local Authorities and developers to protect the integrity of such sites or species. • Implementation of the UK Biodiversity Plan for which it is the contact point for 12 species and one habitat.	The Agency supports action to sustain or improve natural and man-made assets so that they are made available for the benefit of present and future generations. Many development schemes have significant implications for conservation. The Agency will work with developers, Local Authorities, conservation bodies and landowners to conserve and enhance biodiversity.

Landscape: The Agency will further landscape conservation and enhancement when carrying out water-management functions; have regard to the landscape when carrying out pollution-control functions; and promote the conservation and enhancement of the natural beauty of rivers and associated land.		
• The Agency must further the conservation and enhancement of natural beauty when exercising its water-management powers and have regard to the landscape in exercising its pollution-control powers.	• The landscape impact of new development, particularly within river corridors. This is controlled by Local Planning Authorities.	The Agency produces River Landscape Assessments and Design Guidelines which it uses when working with Local Authorities and developers to conserve and enhance diverse river landscapes.
Archaeology: The Agency has a duty to consider the impact of all of its regulatory, operational and advising activities upon archaeology and heritage, and implement mitigation and enhancement measures where appropriate.		
• The Agency must promote its archaeological objectives though the exercise of its water-management and pollution-control powers and duties.	• Direct protection or management of sites or archaeological or heritage interest. This is carried out by LPAs, County Archaeologists and English Heritage.	The Agency will liase with those organisations which have direct control over archaeological and heritage issues to assist in the conservation and enhancement of these interests.
Fisheries: The Agency has a duty to maintain, improve and develop salmon, trout, freshwater and eel fisheries.		
•Regulate fisheries by a system of licensing. •Make and enforce fisheries bylaws to prevent illegal fishing. •Promote the free passage of fish and consent fish passes. •Monitor fisheries and enforce measures to prevent fish-entrainment in abstractions. •Promote its fisheries duty by means of land-drainage consents, water abstraction applications and discharge applications.	•The determination of planning applications which could affect fisheries.	Many development schemes have significant implications for fisheries. The Agency will work with anglers, riparian owners, developers and Local Authorities to protect fisheries.
Recreation: The Agency has a duty to promote rivers and water space for recreational use.		
• The Agency contributes towards its recreation duty through the exercise of its statutory powers and duties in water management.	• Promotion of water sports. This is carried out by the Sports Council and other sports bodies.	The Agency will work with the Countryside Commission, the Sports Council, British Waterways and other recreational and amenity organisations to optimise recreational use of the water environment.
Navigation: The Agency has a duty to maintain and improve navigation, where we are the navigation authority.		
• Maintain river navigation. • Maintain and operate locks and associated weirs and sluices whilst providing access to these sites. • Provide services such as moorings and pump-out facilities. • Maintain navigation by a system of licencing. •Enforce navigation legislation.	• The management and operation of navigations within the region.	The Agency will work with the Broads Authority and Great Yarmouth Port Authority and navigation users to improve navigations generally as valuable environmental, recreational, commercial and heritage resources.

Further Information

Further information on the work of the Agency can be found in a series of Agency strategy documents covering water quality, water resources, flood defence, fisheries, conservation, navigation, recreation, and research and development. These documents are available from the Corporate Planning Section at the Agency's head office in Bristol.

We maintain several public registers which can be inspected at most Regional Environment Agency Offices. Information is usually provided free of charge, but for large and complex requests we may charge for staff time and materials. There are also standard charges for some specific searches. Further details about our public registers and the types of information we hold are available in our leaflet 'A Guide to Information Available to the Public'. Copies are available from the Public Relations Department at our Peterborough office and Area Customer Services.

At present, offices may have information relevant only to their local area; please telephone before visiting to ensure that the information required is available at your local office.

Some environmental details and information about our public registers are available on the internet on **http://www.environment-agency.gov.uk**.

Appendix B: Glossary

Above ordnance datum (AOD)	land levels are measured relative to the average sea level at Newlyn in Cornwall. This average level is referred to as 'Ordnance Datum'. Contours on Ordnance Survey maps of the UK show heights in metres above Ordnance Datum.
abstraction	removal of water from surface or groundwater, either permanently or temporarily, usually by pumping.
abstraction licence	licence issued by the Environment Agency under s.38 of the Water Resources Act 1991 to permit removal of water from a source of supply. It can limit the quantity of water taken daily etc.
Agenda 21	a comprehensive programme of world-wide action to achieve more sustainable development for the next century. UK Government adopted the declaration at the UN Conference on Environment and Development (the Earth Summit) held in Rio de Janeiro in 1992.
algae	a diverse group of simple aquatic plants, some microscopic, which can grow in rivers and the sea in great profusion (blooms).
algal blooms	Rapid growth of phyto-plankton in marine or freshwaters which may colour the water and may accumulate on the surface as a scum.
alluvial	referring to materials eroded, transported and deposited by the action of river flow.
ammonia	a chemical found in water often as the result of discharge of sewage effluents. High levels of ammonia affect fisheries and abstractions for potable water supply.
aquatic plants	a term given to plants that grow entirely covered by water, like water-milfoil, or at the surface, such as yellow water-lily. Some plants have both aquatic and emergent forms.
aquifer	a permeable geological stratum or formation that is capable of both storing and transmitting water in significant amounts.
Asset Management Plan (AMP)	means by which the water undertakers plan the work required and Asset Management capital expenditure necessary for improvements and maintenance of Plan. These are drawn up through consultation with the Environment Agency and other bodies to cover a five year period. AMPs have to be agreed by DETR and Ofwat.
augmentation	the addition of water by artificial input. Usually to 'top up' low flows in the summer by either groundwater pumping or via reservoir release.
baseflow	the flow in a river derived from groundwater sources.
Biochemical Oxygen Demand (BOD)	a standard test which measures over 5 days the amount of oxygen taken up by aerobic bacterial to oxidise organic (and some inorganic) matter.
biodiversity	diversity of biological life, the number of species present.
biomanipulation	Technique developed and refined by the Broads Authority and the Environment Agency, formerly the National Rivers Authority to fully restore lakes and broads in a short space of time.
biomass	a quantitative estimate of animal and/or plant matter.

blue-green algae	ubiquitous, usually microscopic plankton with properties characteristic of both bacteria and algae. In still, calm conditions they can grow to excess to form dense blooms and scum, and are known to produce chemicals toxic to mammals.
buffer zone	strip of land, 10-100 m wide, alongside rivers which is removed from intensive agricultural use.
catchment	the total area from which a single river collects surface runoff.
coarse fish	this is a lay-man's term for cyprinid fish and other commonly associated species such as pike, perch and eels of angling significance. The term does not normally refer to minor species such as bullhead, stone loach, minnow and stickleback.
Coastal and Estuarine Working Party (CEWP)	classification system; under the CEWP scheme stretches of estuaries are allocated points depending on their biological, aesthetic and chemical quality. There are four classes ranging from A to D which classify each stretch of the estuary as good, fair, poor and bad respectively.
consent (discharge)	a statutory document issued by the Environment Agency under Schedule 10 of the Water Resources Act 1991 as amended by the Environment Act 1995 to indicate any limits and conditions on the discharge of an effluent to a controlled water.
consent (land drainage)	an approval for specified structural works in areas under Environment Agency control.
County Wildlife Sites	sites which are of county significance for wildlife.
Countryside Stewardship Scheme	an initiative run by MAFF to enhance and conserve farming landscapes, wildlife habitats and cultural heritage.
diffuse pollution	pollution without a single point source e.g. acid rain, pesticides, urban runoff etc.
dissolved oxygen (DO)	the amount of oxygen dissolved in water. Oxygen is vital for life so this measurement is an important, but highly variable, indicator of 'health' of a water. It is used to classify waters.
District Local Plans	statutory documents produced by District or Borough Councils to implement the development strategy set out in County Structure Plans. Specific land use allocations are identified.
ecosystem	system involving the interactions between a community and its non-living environment.
environmental impact assessment	a process for predicting the impact of development on the environment.
Environmentally Sensitive Area (ESA)	an area designated by MAFF where grant aid is available to support traditional farming methods.
eutrophication	the enrichment of water by nutrients, such as compounds of nitrogen or phosphorus. It causes an accelerated growth of algae and higher forms of plant life, changes in the ecological balance and deterioration in water quality.
floodplain	parts of river valleys or coastal plains which are inundated during floods. It includes areas protected by flood defences.
fluvial	pertaining to, or found in freshwater rivers.

General Quality Assessment (GQA)	a scheme used to make regular assessments of the quality of rivers to monitor trends over time and to compare rivers in different areas. Four components are being developed for the GQA assessment; general chemistry, nutrients, aesthetics and biology, each providing a discrete 'window' on the quality of the river stretches. Currently only two are in use; Chemistry and Biology. The remaining two GQA windows are still under development and will be applied when available.
groundwater	water contained in the void spaces in pervious rocks and within the soil.
habitat	customary and characteristic home of a species or community.
hydrology	the study of water, above, on and below the earth's surface, and its dynamics.
Integrated Pollution Control (IPC)	an approach to pollution control in the UK which takes account of potential effects upon all environmental media. Applies to prescribed processes and uses the principles of BATNEEC and BPEO.
Internal Drainage Board (IDB)	authorities responsible for dealing with land drainage within a district, independent of the Environment Agency. They are primarily concerned with agricultural land drainage but also may be involved with water supply to their district for agricultural purposes. Drainage Boards also have environmental and recreational duties.
landfill site	the engineered deposit of waste into or onto land so that pollution or harm to the environment is minimised or prevented and, through restoration, to provide land which may be used for another purpose.
leachate	solution formed when water percolates through a permeable medium. Can be mineral-rich, toxic or carry bacteria.
Local Agenda 21	A comprehensive programme of world-wide action to achieve a more sustainable pattern of development for the next century. UK Government adopted the declaration at the UN Conference on Environment and Development (the Earth Summit) held in Rio de Janeiro in 1992.
macrophyte	plants clearly visible without the aid of a microscope but excluding lichens, fungi, mosses and algae.
Main River	the watercourse shown on the statutory 'Main River maps' held by Environment Agency and MAFF, designated under the Water Resources Act 1991. The Environment Agency has permissive powers to carry out works of maintenance and improvement on these rivers. Formal consent is required for all activities that interfere with the bed or banks of the river or obstruct the flow.
maintenance works	regular river maintenance such as desilting or weed control.
managed retreat	The deliberate abandoning of an existing tidal defence in order to obtain economic and ecological advantage. A new defence may be constructed landward of the old line.
margin	a term used to describe the junction of the water and the bank.
minimum residual flow	target flow set locally and not legally defined.
National Nature Reserve (NNR)	sites owned or leased and managed by English Nature and established as reserves under the National Parks and Access to the Countryside Act 1949.
Nitrate Vulnerable Zone	an area where nitrate concentrations in sources of public drinking water exceed, or are at risk of exceeding the limit of 50 mg/l laid down in the 1991 EC Nitrate Directive, and where compulsory, un-compensated agricultural measures will be introduced from 1996 as a means of reducing those levels.

percentile	one of 99 values of a variable dividing its distribution into 100 groups with equal frequencies.
phyto-plankton	microscopic photosynthetic organisms adapted to live suspended in water (e.g. algae).
Plan area	referring to the Broadland Rivers Local Environment Agency Plan (LEAP) area
Ramsar	Ramsar* sites are wetlands of international importance. They are statutory areas designated for their waterfowl populations or important plant and animal communities. (* a town in Iran where the international convention originally agreed in 1975 to stem the progressive encroachment on, and loss of, wetland).
reach	a length of channel.
rehabilitation	the partial return to a pristine state.
residual flow	the flow remaining in the watercourse after abstractions have taken place.
restoration	the return to a pristine state.
riffle	shallow, stony or gravely part of river bed where the water surface is broken in low flows.
riparian	relating to or situated on the bank of a river or stream.
riparian owner	owner of land next to river; normally owns river bed and rights to mid-line of channel.
river corridor	land which has visual, physical or ecological links to a watercourse and is dependent on the quality or level of the water within the channel.
runoff	water moving over a catchment surface. Normally regarded as rainfall minus evapotranspiration (evaporation and loss of water by plants) but commonly used to mean rainwater flowing across the land (also known as overland flow).
salmonid fish	game fish, e.g. trout and salmon.
S105 surveys	section 105 of the Water Resources Act 1991 allows for Standards of Service, Assets and Flood Risk Surveys.
sewage	liquid waste from cities, towns and villages which is normally collected and conveyed in sewers for treatment and/or discharge to the environment.
sewerage	a system of underground pipes designed to carry sewage to Sewage Treatment Works.
Shoreline Management Plan (SMP)	a document which sets out the coastal defence strategy for a specified tidal frontage taking account of natural coastal processes and human (and other) environmental influences and needs (also see Section 2.15).
siltation	the deposit of material carried in suspension.
Site of Special Scientific Interest	sites of national importance designated under the Wildlife and Countryside Act 1981 by English Nature in England. Sites may be designated to protect wildlife, geology or land forms.
sludge	the accumulation of solids from treatment processes.
Special Protection Areas (SPAs)	statutory protected habitats for wild birds under EC Birds Directive 79/409/EEC.
Special Area of Conservation (SAC)	areas designated under the EC Habitats Directive. Sites that are considered to be of international importance for key habitats and species.
spray irrigation	the watering of crops by spraying.

Structure Plans	statutory documents produced by County Councils outlining their strategy for development over a 10-15 year timescale.
surface water	general term used to describe all the water features such as rivers, streams, springs, ponds and lakes.
sustainable development	development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
wetlands	areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt.
zooplankton	animal organisms consisting mainly of small crustaceans and fish larvae; the animal constituent of plankton.

Appendix C: Abbreviations

AEG	Area Environment Group
Agency	Environment Agency
AWS	Anglian Water Services
BC	Borough Council
BOD	Biochemical Oxygen Demand
DETR	Department of the Environment, Transport and the Regions
DO	Dissolved Oxygen
EC	European Commission/Community/Union
ESA	Environmentally Sensitive Areas
FRCA	Farming & Rural Conservation Agency
GQA	General Quality Assessment
IPC	Integrated Pollution Control
LEAP	Local Environment Agency Plan
MAFF	Ministry of Agriculture, Fisheries and Food
NALMI	Norfolk Agricultural Land Management Initiative
pe	population equivalent
RE	River Ecosystem
RFO	River Flow Objectives
RSPB	Royal Society for the Protection of Birds
cSAC	candidate Special Area of Conservation
SCEALA	Standing Conference of East Anglian Local Authorities
SMP	Shoreline Management Plan
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UK	United Kingdom
WLMP	Water Level Management Plan

Appendix D: Index

A

B

O

P

R

S

T

W

MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

Head Office is responsible for overall policy and relationships with national bodies including Government.

Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 4UD
Tel: 01454 624 400 Fax: 01454 624 409

ENVIRONMENT AGENCY REGIONAL OFFICES

ANGLIAN
Kingfisher House
Goldhay Way
Orton Goldhay
Peterborough PE2 5ZR
Tel: 01733 371 811
Fax: 01733 231 840

MIDLANDS
Sapphire East
550 Streetsbrook Road
Solihull B91 1QT
Tel: 0121 711 2324
Fax: 0121 711 5824

NORTH EAST
Rivers House
21 Park Square South
Leeds LS1 2QG
Tel: 0113 244 0191
Fax: 0113 246 1889

NORTH WEST
Richard Fairclough House
Knutsford Road
Warrington WA4 1HG
Tel: 01925 653 999
Fax: 01925 415 961

SOUTHERN
Guildbourne House
Chatsworth Road
Worthing
West Sussex BN11 1LD
Tel: 01903 832 000
Fax: 01903 821 832

SOUTH WEST
Manley House
Kestrel Way
Exeter EX2 7LQ
Tel: 01392 444 000
Fax: 01392 444 238

THAMES
Kings Meadow House
Kings Meadow Road
Reading RG1 8DQ
Tel: 0118 935 5000
Fax: 0118 950 0388

WELSH
Rivers House/Plas-yr-Afon
St. Mellons Business Park
St. Mellons
Cardiff CF3 0LT
Tel: 01222 770 088
Fax: 01222 798 555

For general enquiries please call your local Environment Agency office. If you are unsure who to contact, or which is your local office, please call our general enquiry line.

ENVIRONMENT AGENCY GENERAL ENQUIRY LINE
0645 333 111

The 24-hour emergency hotline number for reporting all environmental incidents relating to air, land and water.

ENVIRONMENT AGENCY EMERGENCY HOTLINE
0800 80 70 60

ENVIRONMENT AGENCY

Regional Headquarters:
Environment Agency
Kingfisher House
Orton Goldhay
Peterborough PE2 5ZR
Tel: 01733 371811
Fax: 01733 231840

All Enquiries to:
Jenny Waterworth - LEAP Officer
Environment Agency
Eastern Area (Anglian Region)
Cobham Road
Ipswich
Suffolk IP3 9JE
Tel: 01473 727712
Fax: 01473 271320

AN 3/99-600 E BEMP
Printed on Cyclus TCF paper made from 100% recycled waste fibre.

Designed by The Design Factory, Oundle.